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CAIEP 600 -A57 Canadian
Environmental
Advisory
Council

Annual Review 1973-1974



The Canadian Environmental Advisory Council was established in 1972 by decision of the federal Cabinet, to advise the Minister of the Environment on:

- —such matters as may specifically be referred to it by the Minister;
- --- the state of the environment and threats to it:
- —priorities for action by the federal government or by the federal government jointly with the provinces;
- —the effectiveness of activities of the Department of the Enivronment in restoring, preserving or enhancing the quality of the environment.

The Council is composed of up to sixteen members. It includes the Chairmen of the resource councils advisory to the Minister, plus members at large who serve in an individual capacity and are drawn from a wide cross-section of Canadian life and from all across Canada. Officials of the Department of the Environment are not members of the Council; however the Department provides a continuing Secretariat.

To carry out its functions the Council undertakes studies and reviews of matters of environmental concern and policy, holds regular meetings to consider progress and developments with regard to these concerns, and prepares comments, statements and reports as appropriate. The Council publishes an Annual Review which includes a summary of the state of the environment in Canada, and from time to time reports on other matters of general interest and importance.

Enquiries concerning the work of the Canadian Environmental Advisory Council should be addressed to:
The Executive Secretary,
Canadian Environmental Advisory Council Council

Canadian Environmental Advisory Council -A57

Annual Review 1973-1974

Canadian Environmental Advisory Council

Dr Arthur Porter University of Toronto Toronto, Ontario Chairman

Dr Pierre Dansereau Université du Québec à Montréal Montréal, Québec Vice Chairman

Dr Donald A. Chant University of Toronto Toronto, Ontario

Dr H.E. Duckworth University of Winnipeg Winnipeg, Manitoba

Miss I. Moira Dunbar Department of National Defence Ottawa, Ontario Dr Philippe Garigue Université de Montréal Montréal, Québec

Mr Guy R. Legault Ville de Montréal Montréal, Québec

Dr Joseph B. MacInnis Undersea Research Limited Toronto, Ontario

Dr Ian McTaggart-Cowan University of British Columbia Vancouver, British Columbia

Mr Donovan F. Miller The Canadian Fishing Co Ltd Vancouver, British Columbia Dr Norman H. Morse Grand Pré Nova Scotia

Dr James P. Nowlan Halifax Nova Scotia

Dr E.F. Roots
Science Advisor
Department of the Environment
Ottawa, Ontario
Acting Secretary

Dr J. Keith Fraser Science Policy Branch Department of the Environment Associate Secretary

Working Groups

Inhouse Operations

Dr J.P. Nowlan

Chairman

Mr D.F. Miller

Dr N. Beaupré

Miss I.M. Dunbar

Basics

Dr N.H. Morse

Chairman

Dr D.A. Chant

Dr H.E. Duckworth

Dr P. Garigue

Specifics

Dr I. McTaggart-Cowan

Chairman

Mr G.R. Legault

Dr J.B. MacInnis

July 1st, 1974.

The Minister,
Department of the Environment,
Ottawa, Ontario.

Dear Minister:

We have pleasure in forwarding the Annual Review of the Council for the year 1973-1974.

The Review is divided into two parts. Part A, by the Chairman, discusses in general terms the year's activities; Part B, by the Vice-Chairman, is a report that might be described as a statement on the Canadian environment, 1974.

The Annual Review for 1972-1973, the first year of Council's existence, was in the form of a personal communication from the Chairman to the Minister. It was not considered appropriate for publication because it merely outlined the processes whereby Council was being briefed (by members of the Department of the Environment), and how it was being structured to handle a wide variety of environmental problems essentially in order to advise you on several issues. However, in view of the substantial progress that the Council has made in the past year, we propose that the Annual Review for 1973-1974 should be published. Our object is to draw to the attention of the Canadian people both the achievements of Canada in the maintenance of environmental quality on the one hand and some outstanding problems which are at present under consideration, or which remain to be considered, on the other,

We hope that the attached report will be appropriate as the first of a series of published Annual Reviews of the Council which have the major purpose of facilitating the work of your Department and of informing the public on how the Council is carrying out its mandate.

Yours sincerely,

Arthur Porter, Chairman.

Pierre Dansereau, Vice-Chairman.

And the same of th

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Part A **Activities 1973-1974**

Dr Arthur Porter Chairman

Establishment of the Council

In 1970, the Minister of the then Department of Fisheries and Forestry made public mention of his belief in the need for an independent, interdisciplinary group of informed persons to advise him on problems and policies concerning the Canadian environment. During the following year, the Department of the Environment came into being and consultations took place concerning the composition and terms of reference of such a council. In March, 1972 the creation of an Environmental Advisory Council was approved by Cabinet and the first meeting was held on May 10, 1972, at which time the establishment and composition of the Council was announced. Fifteen members were appointed by the Minister, who designated the chairman and vice-chairman.

Role

The pertinent sections of the Terms of Reference of the Council are:

The purpose of the Canadian Environmental Advisory Council is to advise the Minister of the Environment:

on such matters as may be specifically

referred to it by the Minister, and on

the state of the environment and of threats to it;

c)

priorities for action by the federal government or by the federal government jointly with the provinces;

d) the effectiveness of departmental activities in restoring, preserving or enhancing the quality of the environment; bearing in mind the divided federal, provincial and municipal jurisdictions and the necessity for orderly economic development of the country's resources.

Subject to the availability of funds, the Council shall be empowered to establish committees or working groups from among its members and others to study and report on fields of special interest to the Council.

In the interpretation of these terms of reference the Council recognizes that it is essential to maintain a degree of confidentiality between the Council and the Minister particularly with regard to responses to specific requests for advice from the Minister, and comments on the operation and organization of the Department of the Environment. However, Council also recognizes that it has an important potential role in public education and in the maintenance of public awareness of environmental problems, and that its reports on some subjects should be published and widely distributed across Canada. For example, it seems appropriate for the Annual Review of the Council to include an overview assessment of environmental quality in Canada.

Council sees itself as, and the Minister has concurred that it should be, a nondepartmental, objective source of advice and information for the Minister, for the Department of the Environment, and for the public. To undertake this role, Council must represent a broad range of individual viewpoints from the academic, industrial and public sectors of Canadian

In pursuit of its objectives Council is engaged in three distinct kinds of activities:

a) studies on general problems with important environmental implications and long-4 Meetings of the Council term effects;

b) studies on current environmental problems or on the Department of the Environment's operations and organization, undertaken at Council's own initiative;

studies undertaken at the request of the Minister or requested on his behalf by senior departmental officials.

3 Membership

Members of the Council are appointed by the Minister – in future the normal term of membership will be three years. The past and present members of the Council together with their affiliations, are listed in the Appendix. Noteworthy is the fact that a wide spectrum of disciplines and occupations are represented and members have been drawn from across Canada.

The essentially interdisciplinary nature of environmental problems and the fact that such problems are frequently characteristic of particular geographical regions (e.g. the Great Lakes, the coastal regions, etc.) makes it important that Council has both local or regional insights and a national perspective. In order to fulfill the roles outlined previously there is need for knowledge and experience in a wide range of natural, social and economic sciences, and contacts with industry, educational and research communities, and the general public. While it makes no pretense at covering all fields and no claim to special expertise, the Council does reflect in its membership this range of concerns and connections. In spite of its diversity of interests the Council and especially its working groups have worked together very effectively.

Six meetings of the Council and six meetings of the Executive Committee have been scheduled monthly, although one meeting was cancelled because of a transportation strike. All meetings of Council, with the exception of one held at St. Andrews in August 1973, were held in Ottawa. The standard format has been to assemble in the evening for discussion in depth of a specific topic, and then to meet on the following day to deal more formally with a usually comprehensive and varied agenda.

From time to time Council has been briefed by members of the Department of the Environment on a variety of topics including departmental organization, environmental impact assessment of various major projects, presentations relating to drilling in the Beaufort Sea, environmental services, environmental aspects of the Mackenzie Highway, etc. There has been opportunity for frank and productive interchange of ideas between Council and members of the Department.

The meeting at St. Andrews was especially rewarding insofar as it was held at the Huntsman Marine Laboratory: it included a visit to the Fisheries Research Board Laboratory and first hand examination of the navigational problems which will confront supertankers when Eastport, Maine is developed as a superport terminal. The possibility of serious oil spills in these treacherous channels is high, especially under certain tide and wind conditions. This was the first visit of Council to an area in which the probability of serious environmental damage is appreciable. Similar on-site examinations are planned from time to time in other areas of major environmental concern.

5 Organization

Because of the many items that had to be dealt with in preparation for the meetings, and the desire that regular meetings of the full Council should be devoted as entirely as possible to environmental discussions that warranted the attention, preparation and attendance of heavily committed members of Council, it was decided, in August 1973, to form an Executive Committee which would be responsible for developing agenda, undertaking special assignments, maintaining effective liaison with the Department and, in general, continuously evaluating the role of Council and facilitating its activities. The present Executive Committee consists of the Chairman, the Vice-Chairman, two members at large and the Acting Secretary.

To expedite its work Council has established three working groups which are designated the Working Groups on Basics, Specifics and Inhouse Operations. The Vice-Chairman acts as coordinator. The areas of concern are summarized below:

(i)

The Basics Working Group has been studying matters which may affect longterm governmental goals and policies. To provide a viable basis for policy formulation the Group has been particularly concerned with the development of an "environmental ethic based on ecological absolutes which do not ignore economic 6 Work of the Council and social imperatives", and with the concomitant philosophy of viable environmental management. The Group is concerned with the implementation of national environmental policies integrated with economic, social and resource policies, especially in the light of growth in population, growth in the demand for ... energy, growth in the use of non-renewable resources, etc.

(ii)

The Specifics Working Group has addressed its attention to individual environmental issues of immediate importance and national concern. Examples are the problem of environmental impact assessment, the Mackenzie Valley Corridor, drilling for oil and gas in the Arctic, evaluation of the studies which have been undertaken in connection with the James Bay Development Project, the location and the feasibility of superports in the Gulf of St. Lawrence, an "environmental quality index for Canada", etc.

The Inhouse Operations Working Group has been concerned with the objectives, organization, functions (e.g. the service function, the research function, information to the public, etc.) of the federal Department of the Environment. These considerations include present organization and operations, and also areas which are being neglected, possible future developments, etc.

Each of the Working Groups has formulated specific problems which, because of the detailed research involved, could not readily be handled by the Group per se. In these cases Council has arranged for contracts to be placed with individual Council members and with outside experts. Examples of such contracts have been those arranged in connection with the development of the environmental ethic, studies relating to environmental impact assessment and the examination of a proposed environmental quality index.

Progress reports of the Working Groups and briefings by invited experts, with subsequent discussion, normally constitute the major activities of plenary meetings of Council. The central purpose is to enhance Council's advisory role and to further the concomitant search for national and international environmental objectives that offer optimum chances for survival, prosperity and quality of life. For example, the inseparable ties between the social benefits from the conversion. distribution and utilization of energy on one hand and the environmental implica tions thereof on the other continues to be a central topic for discussion and analysis Council has been aware, also, of its responsibility in the development of an "environmental ethic" and this activity has taken up many hours of debate. Fortunately a consensus has almost been achieved. Council has been concerned also with clarifying and cementing its relations with the Minister and the Department.

To exemplify the broad range of topics 7 Future Activities which have been considered by Council, the following list is typical:

Estuaries: their productivity, development, preservation and responsibility for

management

Urbanization

(iii)

Role and funding of university research

Funding of public interest groups

(v) Energy options.

In addition to the Annual Review and Statement on the Canadian Environment, the following Council publications are in the press or will be shortly:

"An Environmental Impact Assessment Process for Canada" Council Report No. 1, February, 1974.

A paper entitled "An Environmental Ethic-Its Formulation and Implications" Council Report No. 2. (It is intended that his paper, published first in a version for professional and philosophical discussion, will also subsequently be issued in popular general version and in a childen's version.)

'Harmony and Disorder in the Canadian Environment", Council Occasional Paper No. 1. This is a much expanded version, with an extensive bibliography, of Part B of this Annual Review, produced by Dr Dansereau at the request of Council.

It is hoped that the above reports will eceive wide circulation. The Council has Iso produced internal working papers which are not suitable or intended for publication. Such papers relate, for exmple, to the operations of the Departnent of the Environment.

It is anticipated that the activities of the Working Groups will be continued and where appropriate expanded. It can be anticipated that the following topics will be prominent during the third year of Council's life:

(i)

The Energy-Environment issue. At present four major Canadian energy developments are either in progress or being contemplated, viz., the nuclear power programme; the Athabasca tar sands programme, the Arctic Petroleum Resources programmes (e.g., the Beaufort Sea, the Arctic Islands, etc.), gasification of western Canadian coals. Full-scale development of any of these necessitates major financial commitments (each in the order of at least \$50 billion and probably more over a 20 year period). The environmental implications of each are massive, and potentially disastrous if not taken into account early in planning and design; yet the decisions on each involves economic, jurisdictional, national and international

policy issues. Can Canada sustain viable developments in all of these major enterprises? Can environmental knowledge, or the acknowledged lack of it, be given proper place in the political-economic considerations? What mechanisms can compare environment-energy options? (ii)

Public participation in issues relating to environmental quality. By what means can or should the public, whose environmental benefits are often intangible and perceived in the future, express their concerns about activities whose non-environmental benefits are tangible and immediate? What are the environmental "rights" of Citizens?

Environmental education. To what degree should the Department of the Environment lead and shape environmental perceptions?

(iv)

The preparation of an annual "Statement on the Canadian Environment".

(v)

The continued development of mechanisms to ensure effective collaboration between Council and the provincial environmental councils. A first step will be a joint meeting of "Environmental Advisory Councils" organized or called at the invitation of the Canadian Environmental Advisory Council.

Part B **Problems and Priorities** in the Canadian Environment

Pierre Dansereau Vice-Chairman

1 Introduction

A convincing evaluation of the state of the environment in Canada may only be made through a patient and thorough examination of our numerous landscapes across the breadth and width of this large and underpopulated country. The total task force of competent investigators is itself rather limited. If Canada may claim to have produced quite a few good ecologists, as witness its record in the International Biological Programme, it does not yet have nearly enough of them to cope with the many crises that have arisen over its vast expanse. The schools and universities are only now catching up with the task of training personnel qualified to make ecological impact assessments. Various public administrations and many private consultant firms (almost always headed and staffed by engineers) are now employing or seeking to employ 2 Points of Crisis in Canada ecologists or environmentalists.

This is not the place to screen the definitions of the disciplines involved and of their professional implementation, but it suffices to say that environmental science, as now applied, can be entered through many doors, not only by the biologicallybased ecologists of the traditional school, but also by physicists, chemists, engineers, geographers, anthropologists, architects, sociologists and others.

One thing is certain: the solutions to environmental problems can only be reached by inter-disciplinary participation. It is equally certain that there exists no true and trusted pattern for harnessing several disciplines to environmental planning. We in Canada are learning by doing. Our record of the past five years or so is rather a good one, and our eco-planners and ecological assessors have made valuable experiments.

It would serve a useful purpose to examine this record in all of its dimensions if we expect to cope with Canada's environmental problems. The search for a repertory of methodologies rather than for a single grid for all assessments would seem to impose itself, in view of Canada's great environmental diversity. This task is being undertaken by the Department of the Environment and is also the preoccupation of the Canadian Environmental Advisory Council.

However, this report will concern itself with the identification of the environmental issues themselves, attempting to cover the whole ground, and yet inevitably leaving some gaps. At least it will bear witness to the awareness of the CEAC to the crises of this day and to those of the day-after-tomorrow.

Since the present report is, in a sense, on the "state of the environment in Canada." it must identify the areas in which there is a crisis, an emergency, an urgency or a problem, especially in the short-range view.

The perspective which I find most useful 3 Wild Areas in drawing attention to actual points of crisis involves a grouping under four principal headings, inasmuch as the land mosaics that contain the productive ecosystems are the units that have to be protected or managed in some way.

In fact, it is on a world basis that one can recognize the four major components of all land-mosaics: wild, rural, industrial, and urban. *

They are briefly defined as follows:

Wild areas are virtually unaffected by direct human interference, although they may contain a highly scattered human population.

Rural lands are greatly transformed by man, but largely occupied by exploitable vegetation and animal life, whereas the total area of human construction and presence is quite small.

Industrial occupation implies purposeful harnessing of local or imported resources for redistribution or transformation by technological means.

4

Urban settlements conserve virtually nothing of the primeval mineral, vegetable and animal resources and consist of almost entirely built-on space or at least profoundly transformed landscape.

Looking at Canada as a whole, in the light of land use, we find that a very large amount of its territory is wild, but that the vast majority of its population is urban.

A sampling of land-use across the country will show a great variety of mosaics, some with harmonious interfingering of wild and rural; of wild, rural and urban; or of rural-industrial; rural-industrial-urban; but many also that are overwhelmingly of one or the other main types.

It will be pertinent to our present purpose to proceed in a thematic rather than regional way, since we cannot indulge much in an actual land inventory.

The arguments for maintaining large tracts of the Canadian landscape in the wild state come under the following headings.

a)

The preservation of a complete repertory of primeval kinds of rocks, streams, plants and animals.

The availability for recreational, esthetic and other human-oriented activities, of essentially unmodified environments.

The continuance of the wild way-of-life as an option.

d)

The need for further and continued scien tific study of undisturbed ecosystems.

^{*}A technical approach to land-use, where this major division is proposed and illustrated, is the object of a research project now well underway.

We must then ask ourselves what the prevalent land use is within each one of these major units and what the ownership and management regimes are. The principal questions are:

How much public and how much private land?

6)

What is the variety of ecosystems within each major region?

What is the distribution, size and degree of protection afforded each major and minor grouping of regional ecosystems?

What are the function and accessibility of wild lands in each region?

Parks

There is much to be proud of in Canada's federal park organization: its early start, its wise policy, its level of management, etc. As for the provinces, the record is not always so good, inasmuch as many provincial parks, to this day, do not exclude lumbering or even mining! No generalization can be made concerning municipal and private parks.

The park situation, as it stands in Canada today, reveals that there has been no visible plan or purpose to set aside a park within each and every one of the najor natural regional units. Some of them, however, are fairly well sampled, notably the boreal forest, but not the prairie, the sub-arctic parkland, and least of all the eastern temperate forest!

There are no detailed surveys of the national or other parks. The systematic study, on a uniform methodological basis, of all parks (covering the gamut of Canada's major bioclimatic units) is not even underway.

The National Parks Act and its applicaions are much in need of revision, if only Decause it is based on an outmoded conservationist credo.

Water

Water is one of Canada's most abundant resources. Its capacity for electric power development, for irrigation of forest and farm land, for fisheries, and possibly for export as well, has long made its uses controversial, and we cannot be sure that all the right decisions were made, at the right time.

On the largest scale, the International Joint Commission (created by treaty between the USA and Canada in 1909 and formally set up in 1912) was able to settle management controversies between the two countries where waters flowed from the one into the other. But any longterm positive operation such as the St. Lawrence Seaway (very much desired by Canada from the twenties onwards and stoutly rejected by the USA until the late fifties) was very slow in materializing.

The whole question of flood control (especially in the Great Lakes-St. Lawrence), so dramatically revived in the spring of 1974, and its effects on fishing, farming, industrial supply and urban development have been the object of much study. Nothing short of a bold synthesis of the known facts, a better quantitative geomorphological approach, and a tighter integration into long-range multi-purpose planning will put us in possession of a workable distribution of water.

4 Rural Landscapes

The varieties of Canadian rural settlement and economy are, for the most part, coincident with the wild (or bioclimatic) divisions. Behind the present agriculturally-dominated landscapes lie one to three centuries of landscape /inscape interaction. In other words, the natural potential has been developed under the inspiration and limitations of cultural transfers and market tolerances.

As in wild lands, the rationale for maintaining a certain proportion of strategically located Canadian landscapes in the rural state can be summarized in a few simple propositions.

a)

Growing and producing our own food will always be a necessity and it is also an inalienable backdrop of our culture.

b)

The rural way-of-life is one of the main human options and must remain open to a large number of people.

c)

No considerable tract of landscape would seem to be harmonious without rural components.

An inventory of farm practices and of building and growing materials would give us the insight which we lack on Canadian rural settlements. But, again bypassing a study in depth and considering the outstanding aspects of the rural environment, we can get our bearings from the following issues.

The rural-urban ratio of population distribution has reversed itself from 1871 (18.3% urban) through 1921 (47.4% urban), 1931 (52.5% urban) and 1966 (73.5% urban) to 90% predicted for the year 2000.

b)

Mechanization of agriculture has made many farms unviable below a certain acreage, especially in the mixed farming regions of eastern Canada.

c)

A certain conception of international balance-of-trade and of competitive markets has led to drastic reductions in farm production (especially of cereals in the West).

d)

The inroads of electronic and audiovisual information have resulted – together with b) above – in the large-scale alienation of rural labour and its migration to the urban centres.

e)

The proximity to expanding urban areas of rural land has made it highly vulnerable to industrial, suburban and urban development, often via the operations of real-estate speculation.

f)

A possible shift in the Canadian way-oflife towards greater self-reliance of the individual and of the family-unit would place higher value on small but very productive holdings otherwise in the urban matrix.

g)

Concern over too high a degree of dependence on imported food may well favour a directed shift in the rate of rural-urban transfer of population and increased subsidy to agricultural production.

h)

Some alienated urban dwellers are moving to rural areas at the cost of a sometimes radical loss of income; and this may be important enough to determine new planning and legislation.

These eight issues probably dominate the rural scene in Canada at this time and they call for an exhaustive study of rural-urban balance in all of its Canadian patterns, as well as for a comparison with other countries (most notably the Scandinavian states) where more deliberate experimentation has been carried out.

Some of the tasks that will permit a better utilization of the rural environment in Canada at this time, and that meet the issues mentioned above, would be as follows.

Land-use potentials, as recorded and mapped by the Canada Land Inventory, show a number of conflicts (where high values are ascribed to more than one vocation) and a good number of mistakes (where present occupation is on a low-potential site for its vocation). These data are more than ready for the computers and we could engage in a large-scale evaluation, or at the very least in a judicious sampling of representative regional mosaics.

Agricultural technology has operated through the substitution of new tools for old, the newer being presumably more efficient in that they require less time, less labour, and as often as not less personal skill. Balancing the gains and losses, not entirely in terms of economic yield but in terms of human satisfaction, could not the bulldozer and the plough co-exist in the same landscape (as they apparently do in contemporary China)? Could the artisanal-industrial dichotomy be a lure that cannot really be justified by "progress"?

The poisoning of air, water and soil by industrially produced chemicals, applied in massive doses, has resulted in the crippling, death and near-extinction of many forms of wildlife; in the accumulation of toxic substances in otherwise luscious vegetables and healthy-looking poultry. Much is known, of course, on this subject, from the surprising amount of DDT in Antarctic penguins to the high doses of mercury in lake fish to the killing off of vast masses of plankton in the oceans. Lists are peroidically produced of substances to be outlawed on the grounds of their noxiousness. It is not less well known, especially to those having attended UNESCO and UNEP conferences, that the weighing of positive versus negative effects (for instance of DDT) is not scaled in the same way in Brazil and in Canada, in India and in the United States of America.

The quality of rural life presents another set of problems. There is no sense in advocating a return to old farming habits and village life-styles. These are most likely to appeal to the unproductive retired community and to present as much of a dead end as does total conservation of large wild areas. On the other hand, in these days of rampant social engineering, there is no reason to accept as incompatible scientific farming well geared to market realities and the leisure and amenities of a traditional rural ambience.

Improvement of the rural way-of-life through controlled markets, selected subsidies, better transport and communication facilities should be the object of major national and provincial programmes that can only be developed if the motivation and consensus are there. Such a way-of-life is a social objective; it is ecologically and technically well within our planning capacity; its long-run economy can easily be justified if speculation and un-planning are recognized as major evils and its political implementation presents no major difficulties.

Land-banks and the regrouping of farms thus stand out in very sharp focu as indispensable, however our social values may shift, and even if the rural way-of-life mentioned above is the object of no special favour.

Many, if not most, of our Canadian cities are built upon agricultural land of high value and continue to this day to proliferate at the expense of highly productive soil. This cannot be allowed to continue for any reason. The free play of the real-estate market must be checked. We are conscience-bound to know what we are doing, to face squarely the shortsighted trade-offs that we have accepted for several decades. It is true that a twen ty-storey building brings forth more revenue than a cornfield over the same surface. But what are and what will be the respective needs and possible locations of agriculture and urbanized residence?

The sheer obedience to an automatic triggering of real-estate values and to their self-engendered growth has led to such widespread waste and to such irreversible spoilage that it cannot very well perpetuate itself without calamitous effects. Some of these are only too evident:

farmers who can no longer afford to keep and to operate their farms;

city and suburban dwellers who are forced into habitat patterns (e.g., high-rise) that are thoroughly uncongenial;

c)
destruction of entire landscapes that have
a picturesque value and some natural
recreational facilities;

destruction of historical sites, monuments and buildings;

reduction of the total agricultural production, sometimes of a very specialized crop.

The creation of land-banks by provincial governments is therefore imperative. A start has been made in British Columbia with the outlawing of construction on floodplain areas, and with various zoning laws or regulations which are also encountered in other parts of Canada. But no real pattern emerges at this time, and one cannot but feel that federal, provincial and municipal governments in Canada are, in various degrees, lacking in purpose and have not even seriously studied the matter of land-banks.

Industrial Canada

Educational and cultural conditioning, political ties, wealth of heritage and colective discipline seem as important to the reception of industrial impact as the indigenous resource base itself.

From an ecological point of view, it may be useful to look upon industrialization according to the level of exploitation which it most obviously affects, considering the nature of the raw materials (mineral, vegetable, animal) and how much of an energy input is required. The main distinctions concern the increasing energy input, on a scale that runs from mere extraction (mining, peat-cutting, fisheries) of raw materials *in situ* to multilevel processing or manufacturing (refinery, distillery, leather goods), with two intermediary groups that ensure transport and provide power.

The questions that arise concerning industry in Canada are the following.

a)

How does location of industry relate to landscape as a whole?

b

How efficient is the transport system for industrial purposes?

c)

What is the geography of industrial raw materials?

d)

What is the strategy of labour distribution in industrial work?

e)

In what ways and to what extent does industry spread pollution?

f)

What is the role of inter-industrial cycling and recycling?

These questions, like those posed above in the wild and in the rural environments, are best answered in the concrete vision of Canadian industries in the four principal groups mentioned above.

Extractive industries are numerous in Canada and cover the whole territory. Mining has resulted in a craterization only equalled by war. After many decades, Sudbury remains moonlike in aspect, with its burned vegetation and bared rock. Many other sites across the land are almost as ugly, although not always

so productive of a wealth that fails to be re-invested in the rehabilitation of the landscape. Pollution of air (sulfur and silicon) may well be accompanied by pollution of streams (as in the salmonbearing Matane River, in the Gaspé provincial park).

A very similar effect is achieved by quarrying and by borrow-pits where gravel and sand have been extracted. In a radius of less than one hundred miles of Toronto and Montréal, the needs of roadbuilding and urban construction have resulted in the razing of moraines, kames and eskers, the ablation of terraces, and the digging of large pits more or less filled with water. Shining examples of the reclamation of such unsightly and unproductive areas are to be seen in British Columbia (Butchart's Gardens, Queen Elizabeth Gardens), but mostly there is no plan for the successional use of these lands, although Ontario has shown some preoccupation in this direction.

Lumbering of Canada's forests is by no means the worst in the world. But the myth of our inexhaustible woodlands is not all that far behind us and the evidence of indiscriminate cutting is still very much in view. Unquestionably, more scientific and also wiser policies now prevail, although their application is somewhat ironic when a heavily lumbered area is turned into a national park (Parc National

de la Mauricie).

Fisheries (the extraction of fish from fresh water and from the sea) is a world in itself, and Canada's role in covering this domain by scientific inquiry is a major one. This cannot mean that we have managed our water resources all that well. What with damming, spraying of pesticides or pollution of lakes and sea, all is not for the best. Moreover, the fishing force, up from the artisanal to the industrial stage, is not so very disciplined and balanced. The artisanal-industrial ratio will bear re-setting.

Transport industries range very widely physically (a mari usque ad mare) and psycho-socially (The Canadian Dream). The network of seaway, railroad, highway, road, street, walk and path spreads its arterial-to-capillary pattern in ever-denser meshes that do not always relate harmoniously to other land uses.

At this time, transportation in Canada is afflicted with many uncertainties, all of them, in some way, related to the environmental crisis. Just to hit some of the high points:

a)

The ratio of public to private transportation in most cities is the cause of many breakdowns; unchecked, it leads to acute crises.

b)

The inefficient use of private transport (one person per car) is one of the main causes of excessive expenditure and clogging of streets and highways. c)

An overwhelming concern with rapid transit has stamped out corresponding preoccupations with the shortening of travel, the protection of valuable land, the viewing of picturesque landscape, the emission of fumes and noise, etc.

emission of fumes and noised)

The prevalence of private transport has influenced the design and zoning of suburbs to the detriment of physical exercise and neighbourhood activity.

e)

The automobile is the principal agent of air pollution in urban areas.

f)

Noise-abatement laws and speed regulations are both insufficient and unenforced, especially where sports cars, motorboats, motorcycles and snowmobiles are concerned, so the dangers to physical and mental health constantly increase.

a

Over Canada as a whole, and within each province, there is little coordination and planning of the competing services of steamship, plane, railroad, bus, truck and private car.

h)

Walking is a lost art.

Energy-producing industries probably thrust the greatest change upon the environment. The official document *An Energy Policy for Canada*, Department of Energy, Mines and Resources, 1973, seems to be geared to an unconditional growth objective, although it presents itself primarily as a discussion paper.

It requires a very strong dose of optimism and a great deal of scientific and technical imagination to devise a plan (hopefully not too coercive) that will permit continued growth and the attainment of the intended economic goals.

Manufacturing is so diverse that lumping metallurgy, distillery and textiles together may seem artificial. It is not so, I believe, inasmuch as the geographical location of most industrial plants (whether they use mineral, vegetable or animal raw materials, supplied in situ or from afar) obeys very similar requirements. The manufacturing ecosystems need access to constantly renewed raw materials, they must have an uninterrupted amount of power, a reliable work force and an assured system of transport and marketing. A refinery, a paper mill or a shoe factory all have an ugly metabolism that has made them, since the beginning of the Industrial Revolution, the polluters par excellence and rather more so than other kinds of industry considered above.

A picture of industrial Canada, if it could be mapped in some detail, would show the energy charge in terms of the number of successive processes involved in the elaboration of a product. The extraction of gravel which is immediately spread on a nearby road involves a small expenditure, whereas the delivery of a pair of shoes in a retail store is the last act of many, from the breeding, feeding, capture and killing of the mammal, the stripping and tanning of hide, the cutting and

sewing of leather, the designing and assemblage of a shoe, its ornamentation and polishing, its packaging, advertising display and delivery to a wearer. If we can look at this sequence with a truly ecological eye, we are bound to ask ourselves what the hazards are in each of th several ecosystems where at least one stage of treatment occurs (pasture, stock yard, train, slaughterhouse, factory, ware house, store).

Where does the manufacturing industry stand, in Canada, as far as environmental adaptation is concerned? A brief rundown can be made in answer to the following crucial questions, which concern landscape, location, human ecology zoning, legislation and recycling.

a)

Where are the plants located? In wild, rural, industrial or urban landscapes?

Have the environmental conditions of so, wind direction, stream proximity, natural vegetation, nature of settlement been considered at the time of location? Afterwards?

c)

Has the human habitat been planned in the place-of-work ecosystem? The residential ecosystem? The recreational ecosystems? The transportation ecosystems d)

Does the plant fit a particular niche in municipal zoning?

e

Are preventive measures being enacted as well as corrective ones? Does the management respond to environmentally designed planning?

f)

Are by-products and wastes the object of recycling practices?

Some partial answers to these six questions can be given which will help to set our sights.

- a) Landscape. Oil refineries, tankers, isterns, petroleum products, distribution entres occupy wild areas (Norman Vells Mont-Louis, Gaspé Peninsula), ural areas (Thompson), industrial areas Montréal East, Burlington), urban areas Saint John, Vancouver). A similarly vide spectrum is achieved by the pulpnd-paper installations and to a lesser legree by distilleries, breweries, textile nills or leather goods plants that tend to e in an urban setting, are sometimes in rural one, but not often in a wild landcape, whereas they are usually not large nough to create a properly industrial andscape. The food industries are, by ind large, rural and urban.
- b) **Location.** Meat-packing, fishmeal and pulp factories are, as often as not, apwind from urban or village settlements. The decision-making on location and burchase of lots would seem to be economic-technical and to contain hardly any social or ecological elements, although an increasingly evident force is political (i.e., labour-management contests).
- c) **Human ecology** principles, fore-hadowed by the endeavours of indus-rial social workers, may now be applied. The stock of information, however, is very low. It seems to have been no one's business to measure the responses of workers to their physical, biological, ocial, economic and political environment in their place of work, their place of esidence, and in the commuting spaces. In ecological background needs to be harply etched as a framework for the tudy of physical and mental health and, by implication, of individual and collective fulfillment.
- d) **Zoning** has, for some time, retricted the free establishment of new inustries and has been instrumental in hutting out some of them. This has been acreasingly obvious in the larger urban entres, but is not too apparent in rural reas where huge storage tanks block the view of fine architectural and natural rospects. In fact, zoning is the latter art of planning (more about this in the action on Urban Canada).

- e) Legislation on environmental use has tended to be focused on abuse, in the first years (from 1965?) of the "environmental crisis". Although Canada seems to have moved already into a more positive phase where the planning of resource use as a whole and the management of land itself are in honour, the punitive measures are still with us. They are by-and-large rather paltry and inefficient. The cost of adapting cleaning devices to old machinery is alarming to the owners and producers that do not all enjoy the advantages of the planned obsolescence that graces the automobile industry. There are plenty of signs, nevertheless (and whatever the motivation may be), that industrial design has moved into the environmental phase. Canada has no spotless, esthetically pleasant, clean-smelling refinery comparable to Japan's major establishment of this kind at the gates of Tokyo, but it does have a number of good-looking "industrial parks"; some of our rivers have been cleaned of floating logs; the fumes of many industries have been abated. But Sudbury, Murdochville and many other industrial centres still wallow in a mixture of opulence and ugliness.
- f) Recycling is unfortunately not the order of the day. It is considered primarily an economic problem and is more often than not dismissed on the grounds of its costliness. It is inseparable from the problem of waste-disposal and is, of course, contingent upon our view of resource supply for the future and limits to growth. The Science Council's Report No. 14 (1971) emphasized recycling as one of the main issues in the Canadian environmental turnover. As we develop a more satisfying index than the GNP for the appraisal of a well-balanced society and propose a more acceptable (and possibly more "realistic") accountancy for hidden costs and eroded benefits, a more austere

housekeeping is likely to prevail. Many large companies advertise their exclusive use of recycled paper; some manufacturers of beer and soft drinks use returnable containers. Nevertheless, a shocking amount of potentially useful material is wasted.

The Canadian industrial landscape therefore suffers from a faulty integration into the various regional mosaics. It tends to disrupt the wild and the rural fabrics and it perverts the urban tissues as well.

6 Urban Canada

The ecological searchlight on urban spaces is just beginning to reveal unsuspected aspects of the town as a human habitat. This is not the place to draw a historical perspective of the application of specifically ecological thinking and methodology to the urban milieu. A search for origins and ancestors would take us very far back.

Some of the realities most obvious on the urban scene today in Canada are the following:

a)

Cities are growing in size, area and population.

b)

Most of them grew without a proper plan, and are obeying almost exclusively economic imperatives in their rate and direction of growth, and are not subjected to regional directives (and not too obviously to provincial ones).

C

They are increasing their capacity to control wild, rural and industrial land-scapes.

d)

Pollution (chemical, physical, visual, acoustic) is rampant, too expensive to correct, impossible to prevent.

e)

Housing is inadequate in quantity and quality and leaves little choice to the individual or to the family.

f)

Poverty and idleness have become the characteristic of most large cities, ever since the beginning of the industrial revolution. Maybe I can attempt to sort out the positive and negative aspects of these six afflictions by regrouping them under six headings:

- Urban / non-urban patterns and processes
- 2) Urban growth, size and structure
- 3) Housing
- 4) Planning and zoning
- 5) Transport
- 6) Amenities and recreation

In considering the issues that arise under each of these items and in their interaction, the following principles may well serve as a guide.

a)

Diversity in a city consists in the interdigitation and compatibility of as many functions as possible within the neighbourhood cell (residence, commerce, services, recreational and cultural facilities, places of work).

61

Health in a city depends upon the good repair of all facilities (including transportation and residential) and freedom from pollution (including noise), and easy access to care.

c)

Éfficiency in a city is revealed in smoothness of operation, suitability of workforces to tasks, average to high productivity.

d)

Amenity in a city results from relative freedom of choice in abode and occupations, ease of access to essential and non-essential facilities, participation in neighbourhood (and city) decisions, pride in collective esthetic and social achievement.

One would like to designate a city, in Canada or elsewhere, in the present or in the past, to which very high points can be given on all four counts. But were not the amenities of Athens, Rome, Paris or London achieved at the expense of a suffering minority - indeed a suffering majority? Injustice, poverty and oppression have had historical (sometimes genetic) origins, but they have had and still have highly visible ecological consequences and dimensions. Pollution, malnutrition, frustration and crime are rampant in the greatest centres of high efficiency and wealth, such as New York, Tokyo or Berlin. We shall obviously have to deal with relative obedience to these four principles. Thus, Montréal rates much higher than New York, but not so high as Helsinki.

Urban / non-urban patterns and processes The landscape matrices within which our cities are set vary a good deal and afford contacts with wild, rural and industrial land uses that are all too often chaotic and dysfunctional. The half-moon of Toronto opens on the vast expanse of Lake Ontario; Montréal straddles two islands and sprawls upon the south shore of the St. Lawrence; Vancouver stretches its tentacles along a marine inlet and stops abruptly against steep mountains; Winnipeg, Saskatoon and Edmonton are each traversed by a more of less encased river and spread radially into adjacent flatland. Thus the possible contacts between the wild, rural, industrial and urban landscapes (as defined above) are constrained in very different ways.

2

Urban structure, growth and size
Toronto, Montréal and Vancouver all
demonstrate the tendencies that dominate urban development in Canada and
that will continue to do so in the foreseeable future.

a)

Structure will consist of a night /day – weekday /weekend pulsating core; and an amoebic urban tissue encroaching upon rural land in an ecologically indiscriminate way.

b)

Growth will follow the uncoordinated investments of private enterprise with no consideration for harmony.

c)

Size, whilst not unpredictable, is really named part of planning.

Servicing networks and schedules, should one compare Canadian cities with Stockholm or Copenhagen, are hopeless by empirical and lacking in forwardness. This is due, in large part, to the land tenure system, and especially to the reluctance of Canadian municipalities to use their powers of expropriation and constraint.

A tallying of the various constraints permits the development of a grid that would show contrasts in the positive / negative forces in the concentration of populations in towns. The patterning thu obtained would be useful to the definition of urban/non-urban strategy and would meet the following issues.

ow m

How much urban development has occurred on high-grade agricultural land b)

What is the motivation of city-dwellers is acquiring a second home in a rural or wild area?

c)

What is the true residential preference of suburbanites?

d)

How could land-banks be circumscribed and how can legislation deal with speculators?

e)

What is the real state of air and water pollution, and how is it perceived?

Hausin

Housing

A study of the metabolism of towns is inseparable from an inquiry into the housing stock.

From an ecological point of view, one of the first things that comes to mind is the matter of building materials. From this point of view Canadian cities (and even farmhouses) built before 1900 owe a great deal to the characteristics of the geographical region which they occupy: stone, brick, mortar, wood, shingle (and even metal and glass) are derived from local resources. Although these resources may still be available, contemporary houses throughout Canada are constructed with materials imported from great distances. Regional specialization and high industrial efficiency have promoted inter-regional and international exchange to the highest degree. This flow of building materials, accompanied by the acceptance of standardized architectural patterns, has tended to destroy any particular fitness or harmony of building and landscape. The "mobile home" is the final "all-purpose" structure that belongs nowhere, that has no proper ecological niche.

City-scapes at all times have shown evidence of historical addition, superimposition, and succession. A single building, like the cathedral of Chartres, bears witness to the style of several centuries. The present variety of cities as a whole, and of their component neighbourhoods, is thus due to the structure and function of built-up masses. Entire quarters are homogeneous in height, breadth, size, texture, etc., and also belong to the same period. Some of the most attractive European cities display their history, ward by ward, street by street, in the form of buildings as func-

tional now as they ever were. Fragments of such a pageant are visible in Victoria, Montréal, Québec, Fredericton and St. John's, but mostly the juxtaposition of masses suggests a shock of forms and functions where architectural recall clashes with textural anarchy and functional confusion. The resulting non-environment induces recoil and evasion and makes anything like participation unlikely and unreal.

The human habitat, sensu stricto, or abode or dwelling-place, should meet the following requirements:

a)

Space enough to assure privacy and conviviality to all of its occupants.

b

Peace, or freedom from noise, unsightliness, intrusion and other nuisances.

C

Comfort, or protection from excessive heat/cold, light/darkness, humidity/drought; adequate sanitation.

d)

Amenities in decoration, surroundings, storage, conservation, repair and display of possessions.

e)

Neighbourhood integration, or relative similarity of design combined with congenial variety of access to services.

Such are the functions of the individual's (or the family's) habitat. Continuity of occupation and psychological identity are ensured by familiar objects having significance for the inhabitants: fence, tree, door, furniture, books, furnishings and works of art.

Just how well are Canadians, especially urban Canadians, housed as far as the five criteria mentioned are concerned? What is the range, what is the average in the wild, rural, industrial and urban areas?

Wild: Canadian hunting and fishing populations (mostly Indian and Inuit) are reasonably well off, it would seem, in this respect, with benefit of nylon tents, portable stoves, etc.

Rural: Rural houses may be getting uglier with each succeeding generation but are increasingly provided with comfort and household amenities.

Industrial: Typically industrial settlements (of the company-town type) are uniform and monotonous, to be sure, but very comfortable and generally fairly spacious.

Urban: Urban dwellings show the largest range (from the mansion to the hovel) and reveal a real crisis.

Utilization (and non-utilization) of land is so obviously controlled by socioeconomic factors that affect housing that they must at least be enumerated.

a

Speculation maintains land in an unproductive state whilst its value increases through public and private investments.

h

Zoning laws are often obsolete and out-of-step with present requirements and inhibit diversity.

c)

Building is a non-industry, uncoordinated, suffering from undue restrictions (e.g., taxes) on the one hand and from lack of planning on the other.

d)

Residential development is completely dictated by economic and not by social benefit.

e)

Urban renewal has, by and large, been preferred to urban restoration.

f)

Taxation policy, as a rule, diverts land to higher density use.

The real-estate lobby, municipal bureaucracy, supply and labour troubles, acceptance of the economic imperative and indifference to history all combine to allow the disruption of neighbourhoods, the uprooting of communities and the hiltonization of city-scapes (witness Québec City).

4

Planning and zoning

If zoning in Canadian cities is inadequate, obsolete and unduly coercive, this may well be a result of administrative shortsightedness, compliance with vested interests, and rigidity of application. It is also due to the fact that alternative options are unknown to many citizens and neglected by planners, that prevalent architectural and social trends go unchallenged, and that the present economic order is assumed to be permanent. The perpetuation of legalized disorder and institutionalized injustice is therefore the standard. It is simply not possible to consider either zoning or planning in a purely technical and scientific way without reference to the underlying values.

Ecology and eco-planning are not likely to redress the Canadian urban prospect. Nor do eco-planners start as nearly from scratch as some of them assume. A submission of urban structures and functions to an ecological examination through the binoculars of natural and social science is nevertheless our principal hope. The presence of ecologists in virtually all phases of planning and implementation is the best possible guarantee of environmental protection and environmental management.

The principal questions that pose themselves to Canadian planners can be grouped under the following headings:

Salvage operations. Revitalization of roads, spaces and buildings whose functions have lapsed or diminished (rail-road tracks, empty lots, churches, warehouses).

b)

Renovation processes. Destruction of slums, warehouses, commercial blocks or unsanitary, unsafe, unattractive and non-significant buildings to be replaced by more functional ones.

C

Growth control. Patterning and zoning of all intended development, and repatterning of already obsolete or undesirable servicing media.

d

Transport and circulation flow.

Timing of traffic on existing throughways, and re-allocation of walking and driving areas, and of private and public vehicle use.

e)

Spacing and accessibility of amenities. Ratio of green spaces and other recreational spots to area and population.

The environmental issues under each of these items are numerous. The principle of continuity, mentioned above, militates strongly against the destruction of churches whose congregations have dwindled, old railroad stations that cater to reduced traffic (or none at all), ornate Victorian houses with wastefully monumental staircases, etc. One may well turn to Moscow and Leningrad where some such buildings are turned into museums, and others have been dedicated to a new function (library, swimming pool, community centre), admittedly without much grace. The citizens of a city that forces them to live only in the present and with no reminders of their history (yes, even jails, slavery, colonialism, capitalism, . . .) are very impoverished indeed!

Renovation is justified mainly where a new dedication does not destroy a heritage which is capable of salvage and active use. In fact, an urban planner's programme is geared to all six items under review in this section. 5

Transport

Some of the greatest adversities suffered by the urban population are to be encountered on the transport circuit. The nervous stress of solitary commuters driving over-powerful and wasteful vehicles at alternating high speeds and bumper-to-bumper jerking halts present a staggering expenditure of unproductive human effort. Harmful levels of chemica pollution and of noise are reached inside the city limits. Damage to vegetation and to what is left of wildlife (and to human life) is thus rampant, and is increased in snowy Canada by the widespread use of brutal snow-removal machinery and its accompaniment of corrosive salt.

The work-residence-recreation movements, daily and yearly, on the intracity and intercity networks are badly scheduled and unaccompanied by the kind of relief which various forms of public or collective transport would offer The deterioration of the public/private ratio is counter-historical in creating ever-increasing deadlocks.

The crisis in transportation stems from the following causes:

a

Too many vehicles and too much reliance on private transport b)

Lack of residential facilities in densest working areas

c)

Absence of collective transport in suburbs

d)

Inadequacy of rapid ground and underground transit

e)

Narrow range of working hours

f)

Status attached to large, expensive cars g)

Increasing cost of fuel

h)

Increasing rate of noise and pollution

The occasional (and for some commuters, frequent) nightmare of traffic jams epitomizes all of these features.

Amenities and recreation

In recent years, students of cities have attached much importance to perception of environment. Thus all bear witness to the regional and social diversity of the inner reflection that precedes the projected wish and the move to its implementation.

Perhaps I should start by saying that the five requirements under "Housing" above (space, peace, comfort, amenities and neighbourhood integration) constitute a lower threshold of amenity and that some reality of fulfillment obtains only if an additional surplus is available.

The meaning or meanings of "amenity" and "recreation" are to some extent elusive, but even within the compass of a shifting definition it is not impossible to delineate the problems. The leading questions seem to boil down to the following:

ioliowing: *a)*

How is diversity of choice to be assured with respect to housing, transport, education, recreation and other forms of sharing in the collective benefits?

What mechanisms do we have for offering real alternatives and for quantifying the trade-offs?

c)
How do we measure efficiency or productivity at work, and value of service

rendered?

What is the final measure of health (physical and mental) and of community fitness?

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What is really "tolerable" in a polluted environment and what price can a city ultimately pay for cleanliness?

f)
In what way do we really need green spaces?

g)

How can we assure a reasonable balance (although a shifting one) of privacy / togetherness, (architecturally, socially, environmentally)?

h

What are the most satisfactory ways of ensuring consultation and also efficiency of decision-making?

In a strict sense, none of these questions are environmental. They are social and psychological and, of course, economic. But different answers have different ecological consequences.

7 Priorities

This cursory scanning of Canada's landscape with a roving ecological eye reveals in the diverse environments a number of crises. In a world perspective, Canada is very fortunate indeed for it does not suffer from earthquakes like Costa Rica, from drought like the Sahelian lands, from erosion like Haïti, from hunger like India or from crowding like Japan. That is not to say that the Canadian environment is not menaced. I have been at pains to point out many deteriorations, some of them irreversible, that scar so many landscapes. Good management has not always prevailed, even less ecological wisdom.

Canada needs a programme on environmental management. It may well be the Canadian Environmental Advisory Council's primary vocation to write such a programme. The questions defined, considered and investigated by the Council spread across a wide frame, essentially covering the guestions outlined above. I shall not presume to outline such a programme, but I will try to abstract from the foregoing survey what seem to me the inescapable focal points: austerity, science, planning, information and consultation. Under each of these headings we may be able to gather the threads of sound principles to test the issues that have arisen in the face of various crises and through study and research to reach solutions that will allow better use of our resources.

Austerity requires a heightened consciousness of our whole environment and a willingness to spare and to re-use. Science is the indispensable tool of investigation which will provide a true image of our ecosystems prior to decisions concerning their exploitation.

Planning is derived from moral, political, social and scientific tests of the technically, economically and ecologically allowable choices.

Information must be obtained in full freedom and disseminated at various levels.

Consultation is of the essence if the people potentially affected by a decision concerning their environment are to participate; and, at the other end of the scale, if workable international agreements are going to be enacted.

Appendix Membership, 1972-1974*

Dr N. Beaupré** Chairman & President DOMTAR Ltd. Montréal, Québec 1972-1974

Dr N. Carpenter University Hospital Edmonton, Alberta 1972-1973

Dr D.A. Chant Chairman, Department of Zoology University of Toronto Toronto, Ontario 1972-

Dr P. Dansereau Université du Québec à Montréal Montréal, Québec 1972-

Dr H.E. Duckworth President University of Winnipeg Winnipeg, Manitoba

Miss I.M. Dunbar Defence Research Establishment Department of National Defence Ottawa, Ontario 1972Dr P. Garigue Faculty of Social Science Université de Montréal Montréal, Québec 1973-

Dr L.-E. Hamelin Centre d'études nordiques Québec, Québec 1972-1973

Mr E.A. Horton Mayor, Borough of Etobicoke Etobicoke, Ontario 1972-1973

Mr G.R. Legault Director Housing & City Planning Department City of Montréal Montréal, Québec 1973-

Dr J.B. MacInnis Undersea Research Limited Toronto, Ontario 1972-1974

Dr I. McTaggart-Cowan Dean of Graduate Studies University of British Columbia Vancouver, British Columbia 1972-

Mr D.F. Miller President The Canadian Fishing Co. Ltd. Vancouver, British Columbia 1972Dr N.H. Morse Grand Pré, Nova Scotia 1972-

Dr J.P. Nowland Halifax, Nova Scotia 1973-

Dr. A. Porter Chairman Department of Industrial Engineering University of Toronto Toronto, Ontario 1972-

Mr R.F. Shaw Deputy Minister Department of the Environment Ottawa, Ontario 1972-1973

Dr M. Slivitsky Director Water Resources Institute Université du Québec Québec, Québec 1972-1973

Mr F.F. Todd President Mining Association of Canada Oakville, Ontario 1972-1973

Secretariat, Department of the Environment

Dr E.F. Roots

Acting Secretary, 1974-

Dr J.K. Fraser Associate Secretary, 1974Dr R.R. Logie Secretary, 1972-1974

Dr F.K. Hare
Associate Secretary, 1972-1973

^{*}Jusqu'au 1er juillet 1974.

[°] Décédé en 1974.

Terms of Reference

- 1 The purpose of the Canadian Environmental Advisory Council is to advise the Minister of the Environment:
 - a on such matters as may be specifically referred to it by the Minister, and on b

the state of the environment and of threats to it;

priorities for action by the federal government or by the federal government jointly with the province;

the effectiveness of departmental activi- 6
ties in restoring, preserving or enhancing
the quality of the environment;

Subject to the availability of funds, the
Council shall be empowered to establis
committees or working groups from

bearing in mind the divided federal, provincial, territorial and municipal jurisdictions and the necessity for orderly economic development of the country's 7 resources.

2 The Chairman and the other members of the Council shall be appointed by the Minister for terms not normally exceeding three years, may be re-appointed, and shall represent the following:

Chairmen of resource councils advisory to the Minister

Members at large

- 3 The Department of the Environment shall provide a secretary.
- 4 The Chairman, in addition to presiding at meetings, shall be responsible for developing and directing the work of the Council.
- The Council shall meet not less than twice per annum at predetermined times, and at such additional times as may be required at the call of the Chairman.
 - Subject to the availability of funds, the Council shall be empowered to establish committees or working groups from among its members and others to study and report on fields of special interest to the Council.
- 7 The Department of the Environment shall provide a budget to cover the operational costs of the Council. The budget shall include provision for payment of ordinary transportation costs and living expenses plus per diem allowances of seventy five dollars.



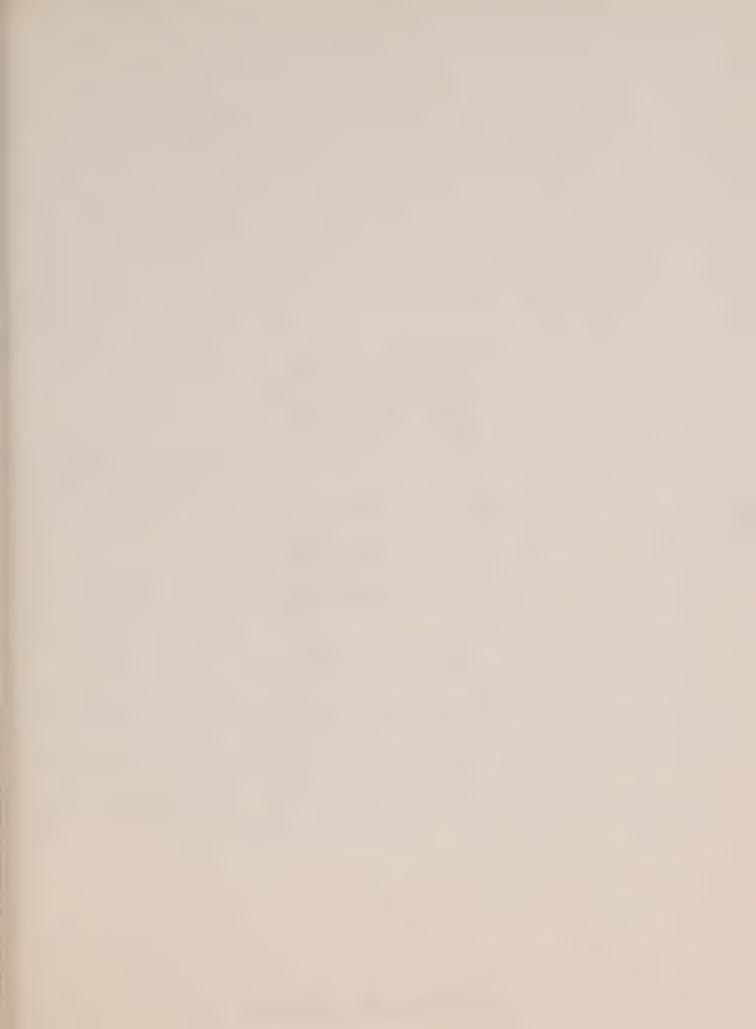


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3 Le ministère de l'Environnement doit fournir un secrétaire.

4 En plus de présider les réunions, le président doit être chargé d'élaborer et de diriger le travail du conseil.

5 Le conseil doit se réunir au moins deux fois par année à des dates préétablies et à d'autres moments, au besoin, sur convocation du président.

6 Sous réserve de la disponibilité de fonds, le conseil doit avoir le pouvoir de créer des comités ou des groupes de travail composés de ses membres ou d'autres personnes afin de faire des études et des rapports sur des domaines d'intérêt particulier.

7 Le ministère de l'Environnement doit fournir un budget qui couvre les frais opérationnels du conseil. Le budget doit prévoir le paiement des frais de déplacement et de subsistance ordinaires ainsi qu'une indemnité de \$75 par jour.

1 Le Conseil consultatif canadien de l'environnement a pour objet de conseiller le ministre de l'Environnement sur:

toutes questions pouvant lui être renvoyées par le ministre;

l'état de l'environnement et des menaces dont il fait l'objet;

c)
 les priorités en ce qui concerne les interventions par le gouvernement fédéral agissant seul ou de concert avec les provinces;

d)
I'efficacité des activités du ministère
visant à restaurer, conserver ou rehausser
la qualité de l'environnement; compte
tenu des diverses compétences fédérale,
provinciales, territoriales et municipales,
et de la nécessité d'assurer l'expansion

2 Le président et les autres membres du conseil doivent être nommés par le ministre pour une durée ne dépassant normalement pas trois ans; ils peuvent être nommés à plus d'une reprise et doivent représenter les présidents des conconseils de ressources chargés de conconseils de ressources chargés de conconseils de ressources chargés de conconseils de ministre, et les membres extraordinaires.

*4797-1974

Secrétaire associé, 1972-1973 M. F.K. Hare

Secrétaire, 1972-1974 M. R.R. Logie

Secrétariat, ministère de l'Environnement

61

Décédé en 1974. Jusqu'au 1et juillet 1974.

Secrétaire associé, 1974-

Secrétaire intérimaire, 1974-

N. J.K. Fraser

N. E.F. Roots

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1972-

résident

N. D.A. Chant

1972-1973

1972-1974

résident

résident

(Ontario) Ewetto

Mile I.M. Dunbar

Ainistère de la Défense

Centre de recherche pour

Winnipeg (Manitoba) Université de Winnipeg

N. H.E. Duckworth

Nontréal (Québec)

N. P. Dansereau

(Ontario)

Université de Toronto

Edmonton (Alberta)

University Hospital

Nontréal (Québec)

N. N. Carpenter

991J RATMOC

N. N. Beaupré **

Département de zoologie

Jniversité du Québec

(aupinnatina Vancouver (Colombiepll The Canadian Fishing Co.

Président M. D.F. Miller

1972-Britannique) Vancouver (Colombie-Colombie-Britannique

Université de la sauneiriedus Doyen des études

M. I. McTaggart-Cowan 1972-1974

Toronto (Ontario) Undersea Research Limited M. J.B. MacInnis

1873-Montréal (Québec) Ville de Montréal

et de la planification

Département du logement Dwecteur M. G.R. Legault

1972-1973

Etobicoke (Ontario) Borough d'Etobicoke Maire

M. E.A. Horton

1972-1973 Québec (Québec) Centre d'études nordiques

M. L.-E. Hamelin

1813-Montréal (Québec) Université de Montréal

sociales

Faculté des sciences

M. P. Garigue

M. J.P. Nowlan

1972-

Canada

1972-1973

Oakville (Ontario)

Président

Mining Association of

M. F.F. Todd

1972-1973 Québec (Québec)

Université du Québec eu egn

Institut des ressources

Directeur

M. M. Slivitsky

1972-1973

(Oitawa (Ontario)

l'Environnement Ministère de

Sous-ministre W. R.F. Shaw

-2761 Toronto (Ontario) Université de Toronto génie industriel

Département de Président

M. A. Porter

-8/61

Halifax (Nouvelle-Ecosse)

Ecosse)

Grand Pré (Nouvelle-

M. N.H. Morse

d'aménagement de l'environnement. Le Canada a besoin d'un programme

sultatif canadien de l'environnement sera La tâche principale du Conseil con-

La science est l'instrument indispende réutiliser. ronnement et le désir d'économiser et prise de conscience de tout notre envi-L'austérité requiert une plus grande tion de nos ressources naturelles. solutions visant à une meilleure utilisaet, par l'étude et la recherche, trouver des qui ont surgi face aux divers problèmes cipes solides pour examiner les questions éléments permettant d'établir des printitres nous pouvons peut-être réunir des la consultation. Sous chacun de ces science, la planification, l'information et paux points de repère: l'austérité, la de déduire de ce qui précède les princiun programme défini, mais je vais tenter vais pas prendre sur moi de recommander celles qui sont énoncées plus haut. Je ne vastes domaines; on peut en juger par examinées par le conseil couvrent de Les questions définies, envisagées et peut-être d'élaborer un tel programme.

naux praticables.

niveaux.

réalisables.

leur exploitation.

veut arriver à des accords internatioveulent y participer et, d'autre part, si on

ment possible et diffusée à tous les

L'information doit être le plus facile-

niques, économiques et écologiques fiques qui permettent les choix tech-

morales, politiques, sociales et scienti-

La planification découle des épreuves

avant la prise de décisions concernant

une véritable image de nos écosystèmes

sable de la recherche qui nous donnera

décision concernant leur environnement

part, les gens qui seront touchés par une La **consultation** est essentielle si, d'une

> de décisions? la consultation et l'efficacité de la prise Quels sont les meilleurs moyens d'assurer

> écologiques diverses. réponses diverses ont des conséquences naturellement, à l'économie. Mais des liées à la sociologie, à la psychologie et, ment d'ordre environnemental. Elles sont Aucune de ces questions n'est stricte-

7 Les priorités

et encore moins la sagesse écologique. La bonne gestion n'a pas toujours prévalu leur marques sur beaucoup de paysages. certains sont irrémédiables, qui ont laissé signaler de nombreux dommages, dont nacé. Je me suis donné la peine de vironnement canadien ne soit pas me-Japon. Cela ne veut pas dire que l'en-Inde et il n'est pas surpeuplé comme le Haîti; la faim n'y règne pas comme en comme le Sahel, ni à l'érosion comme blique de Costa Rica, ni à la sécheresse tremblements de terre comme la Répuchance puisqu'il n'est pas exposé aux le Canada a vraiment beaucoup de zones. Dans une perspective mondiale, certain nombre de crises dans les diverses du point de vue écologique révèle un Cet examen rapide du territoire canadien

> Le sens ou les sens des mots «com-:snidins ment si on peut disposer de quelque taine satisfaction réelle s'obtient uniqueinférieur des commodités et qu'une cerintégration au voisinage) sont au seuil (espace, paix, confort, commodites et plus haut à l'enseigne du «Logement» dire que les cinq conditions énoncées Je devrais peut-être commencer par

sont les suivantes: s, y rattachent. Les questions principales impossible de définir les problèmes qui des définitions changeantes, il n'est pas une certaine mesure, mais même avec ansb sugidms fros «risiol» to «btibom

(q sociaux? autres manières d'accéder aux bénéfices transport, l'instruction, les loisirs et les choix en ce qui concerne le logement, le Comment peut-on assurer la diversité de

Comment évalue-t-on l'efficacité ou la () change et pour quantifier les compromis? pour offrir de véritables solutions de re-De quels mécanismes disposons-nous

(physique et mentale) individuelle et Quel est la mesure commune de la santé (p service rendu?

productivité au travail et la valeur d'un

communautaire?

(8

payer pour sa propreté? est, en définitive, le prix qu'une ville peut dans un environnement pollué et quel Qu'est-ce qui est réellement «tolérable» (9

d'espaces verts? En quoi avons-nous réellement besoin

tectural, social et environnemental)? les autres (du point de vue archigeant) entre l'intimité et le contact avec équilibre raisonnable (bien que chan-Comment pouvons-nous assurer un (6)

:unwwo

(səjijnu

l'automobiles et des transports en icules; planification de l'utilisation aces destinées aux piétons et aux véoies rapides et réattribution des surynchronisation de la circulation sur les noyens de transport et de circulation:

en et de réparation désuets ou jugés t replanification des services d'entret zonage de tout aménagement futur outrôle de la croissance: planification

(autres plus utiles;

t sans intérêt, pour les remplacer par ueuts malsains, peu sûrs, inesthétiques 'immeubles commerciaux ou des bâtiles taudis, des entrepôts et des groupes vocessus de rénovation: destruction

ntrepôts); voies ferrées, terrains vagues, églises, artiellement ou entièrement désaffectés es espaces, des routes, des immeubles

pérations de sauvegarde: revivification egrouper sous les titres suivants:

nx blanificateurs canadiens peuvent se Les principales questions qui se posent nent de l'environnement.

ossible de protection et d'aménageimplantation est la meilleure garantie ontes les phases de l'urbanisation et de a présence des écologistes à presque spect des sciences sociales et naturelles. 32 touctions urbaines sous le double éanmoins, d'examiner les structures et sugent. Notre plus grand espoir est, éro comme certains d'entre eux le précologistes ne partent d'ailleurs pas de erspective urbaine. Les aménageurséco-planification puissent corriger la

Il ne semble pas que l'écologie et dne sans se reporter aux valeurs souse vue purement technique et scientifriod nu'b noisesinediu'l uo agenos i ormal. Or, il est impossible d'envisager ésordre et l'injustice établis est donc lie actuelle est permanente. Perpétuer le stées et qu'on présume que l'éconol sociales prédominantes sont incon-

et de sel corrosif. au Canada par l'emploi de chasse-neige tenus en échec et sont encore augmentés d'animaux (et à l'homme) ne sont pas causés à la végétation et à ce qui reste miques et par le bruit. Les dommages nocifs de pollution par les produits chilimites de la ville, on atteint des niveaux rante d'inutiles efforts humains. Dans les bare-choc, représente une dépense atters suffant brusquement pare-choc contre leur d'énergie, à grande vitesse et en duit un véhicule trop puissant et gaspil-Le stress du voyageur solitaire qui congrands désagréments de la vie citadine. urbaines subissent quelques-uns des plus C'est sur les routes que les populations stroqenert 292

actuellement. sur les six aspects que nous examinons fait, le programme d'un urbaniste porte héritage qui peut être sauvé et utilisé. En

nouvelle affectation ne détruit pas un La rénovation se justifie surtout si la vraiment très appauvris culturellement! colonialisme, le capitalisme . . . , sont (oni, même les prisons, l'esclavage, le présent, sans le moindre rappel historique les oblige à vivre uniquement dans le d'élégance. Les citoyens d'une ville qui mais, il faut l'admettre, sans beaucoup dnes' biscines, centres communautaires), fectés à de nouveaux usages (bibliothèformés en musées, d'autres ont été aftains bâtiments de ce genre ont été transexemple, à Moscou et à Leningrad, cerliers inutilement monumentaux, etc. Par chargées d'ornements et dotées d'esca-(ou nul), de maisons victoriennes surde chemins de fer dont le trafic est réduit de fidèles ont diminué, de vieilles gares truction d'églises dont les congrégations plus haut est fortement opposé à la des-

Chacun de ces points présente de total et la population, d'autre part. de récréation, d'une part, et l'espace entre les espaces verts et les autres aires commodités: rationalisation du rapport répartition et accessibilité à certaines

Le principe de la continuité mentionné

nombreux problèmes environnementaux.

cèdent le projet et l'implantation. ciale des images intérieures qui prètémoins de la diversité régionale et soception de l'environnement. Ils sont attaché beaucoup d'importance à la peranalysent les problèmes urbains ont Au cours des dernières années, ceux qui Commodités et loisirs

résume et symbolise tous ces faits.

re canchemar des embouteillages par les émanations des véhicules. escalade de la pollution par le bruit et

augmentation du prix du carburant;

prestige conféré par les voitures de luxe;

éventail étroit des heures de travail;

(9

port terrestre et souterrain; insuffisance de moyens rapides de trans-

(p

jes psulieues;

manque de transport en commun dans (D

centres des affaires;

manque de logements dans les grands

grande utilisation de voitures particulières; trop de véhicules sur les routes et trop

par les faits suivants:

La crise de la circulation est causée des problèmes sans issue. est à contre-temps et ne cesse de créer publics et privés en faveur de ces derniers entre l'utilisation des moyens de transport Le déséquilibre croissant du rapport transport en commun pourraient assurer. le genre de détente que divers moyens de ation sont mal synchronisés et n'offrent pas du domicile au travail et aux lieux de récrédiens et annuels, en voitures particulières, Les horaires des déplacements quoti-

communo: facilité d'accès aux divers services caractéristiques de l'architecture et à la L'intégration au voisinage se mesure aux

collective. tallation et leur identité personnelle et d'art, assurent la permanence de leur insdes livres, des meubles et des œuvres rière, un arbre, une porte, un mobilier, attachent de l'importance, tels une barquels les habitants d'une maison individuel ou familial. Les objets aux-Telles sont les fonctions de l'habitat

sauvages, rurales, industrielles et portion les trouve-t-on dans les zones sortes d'habitations et dans quelle proci-dessus? Quelles sont les diverses logés suivant les conditions énoncées Canadiens, surtout les citadins, sont-ils Dans quelle mesure exactement les

nanties de ce point de vue-là avec leur nuits) sont, à ce qu'il semble, assez bien -nl'b te aneibnirèmA'b traqulq al ruoq de chasseurs et de pêcheurs (composées Dans les zones sauvages: les populations urbaines?

mais elles acquièrent de plus en plus de laides avec chaque nouvelle génération, campagne deviennent peut-être plus Dans les zones rurales: les maisons de portatifs, etc. tentes en nylon, leurs réchauds

esioegruod nosism sl siugeb) etilsgenise habitations qui accusent la plus forte Dans les zones urbaines: ce sont les tables et généralement assez spacieuses. tormes et monotones, mais très contor--inu mos (elanorise elliv eb anoitatidad tations typiques de ces régions (genre Dans les zones industrielles; les habiconfort et de commodités.

tation qu'il faut au moins les énumérer. facteurs socio-économiques liés à l'habiterres est si manifestement régie par des L'utilisation (et la non-utilisation) des réelle ici.

Inadn an faudis); il existe une crise

à-vis du passé, tout cela contribue à la ratifs économiques et l'indifférence vismain-d'œuvre, l'acceptation des impéles crises d'approvisionnement et de lières, la bureaucratie municipale, Les tractations des agences immobiesbaces. mène à une utilisation plus intensive des La politique de taxation, dans l'ensemble préférée à la restauration urbaine. La rénovation urbaine est, en général, sociaux. economidnes et non par les avantages est entièrement dicté par les impératits r, swęusdeweut abs zones résidentielles de planification. et, d'autre part, elle souffre d'un manque traintes injustes (par exemple des taxes) et, d'une part, elle est assujettie à des conses activités ne sont pas coordonnées La construction est une non-industrie: soins actuels et interdisent la diversité. qesnetes, ne correspondent plus aux be-Les lois sur le zonage sont souvent blics et privés. augmente par des investissements puétat improductif tandis que sa valeur La spéculation maintient la terre dans un

(9

(q

coercitif, c'est peut-être le résultat d'une Si le zonage dans les villes canadiennes Planification et zonage mation des villes (par exemple à Québec) ment des collectivités et à la transfordestruction des quartiers, au déracine-

tives, que les tendances architecturale ne tiennent pas compte de ces alternad'autres possibilités, et que les urbanistes breux citoyens ne savent pas qu'il existe est également dû au fait que de nomdité de l'application des mesures. Cela ceptation des droits acquis, et de la rigiimprévoyance administrative, de l'acest inapproprié, désuet et injustement

'suoissassod tion, réparation et déploiement des environnement, entreposage, conservales commodités en matière de décoration, (p flons sanitaires; resse, et l'assurance de bonnes installa-

on d'obscurité, d'humidité et de séche-

excès de chaleur ou de froid, de lumière

le confort, ou la protection contre les

violée, ne pas être dérangé d'aucune

gréable, ne pas voir l'intimité du foyer

par le bruit, ne pas avoir de vue désa-

de s'y retirer ou de s'y réunir;

toyer, le chez-soi, devrait avoir les

L'habitat humain, sensu stricto, le

résulte incite à l'évasion et ne favorise

confuses. L'absence d'ambiance qui en

textures hétéroclites et des utilisations

imitations architecturales jurent avec des penser à un chaos de formes où des

position de masses de constructions fait Jean, dans la plupart des cas, la juxta-

à Victoria, Québec, Fredericton et Saint-

trouve encore des immeubles prestigieux nuent à être fonctionnels. Bien qu'on

chaque rue, dans des bâtiments qui conti-

belles villes d'Europe étalent l'histoire de

même époque. Quelques-unes des plus

hauteur, de largeur, de dimensions et de

Des quartiers entiers ont des bâtiments de

constructions et de l'usage qu'on en fait.

des villes et de leurs environs est due, par

de plusieurs siècles. La diversité actuelle la cathédrale de Chartres, rappelle les styles

tecturales. Un même monument, comme

les surimpositions et les successions archi-

Les villes ont, de tout temps, offert un

témoignage historique par les additions,

conséquent, à la forme de multiples

texture semblables, et sont aussi de la

leur pays, dans chaque quartier, dans

avantages suivants:

guère la participation.

la paix, c'est-à-dire ne pas être ennuyé

l'espace qui permet à tous ses occupants

()

(8

autre manière;

une zone rurale ou sauvage? acquérir une résidence secondaire dans Qu'est-ce qui pousse les citadins à

Seueilned eb stnetided eeb Quel est le genre d'habitation préféré

tion pourrait-elle enrayer la spéculation? de terres arables et comment la législa-Comment pourrait-on créer des banques

pollution est-elle perçue? réellement pollués et de quelle façon la Jusqu'à quel point l'air et l'eau sont-ils

Une étude du métabolisme des villes re logement

le matériau de construction. Sous cet premières choses qui vient à l'esprit, c'est Du point de vue écologique, l'une des quête sur le stock des habitations. s'accompagne obligatoirement d'une en-

mobile est la structure à toutes fins qui construction et le paysage. La maison éliminer les rapports et l'harmonie entre la architecture unifiée a eu tendance à construction et l'acceptation d'une tionaux. L'importation des matériaux de les échanges interrégionaux et internaindustrielle ont favorisé au plus haut point cialisation régionale et la haute efficacité en matériau importé de très loin. La spétemporaines du Canada sont construites exister encore, mais les maisons consources locales. Ces ressources peuvent métal et le verre sont des dérivés des resle mortier, le bois, le bardeau et même le graphiques de la région: la pierre, la brique, vent beaucoup aux caractéristiques géoles fermes) construites avant 1900 doiaspect, les villes canadiennes (et même

ficulier, qui n'a pas de niche écologique

ne rappelle aucun climat ou paysage par-

propre.

Croissance, dimensions et structure

ront à l'être dans un avenir prévisible. sion urbaine au Canada et qui continuedominantes en ce qui concerne l'expanquent toutes les trois des tendances Toronto, Montréal et Vancouver indisəllin səp

mination écologique. empiétant sur la zone rurale sans discrimaine) et une expansion périphérique centrale (jour/nuit, semaine/fin de se-La structure consistera en une pulsation

l'entreprise privée sans tenir compte de d'investissements non coordonnés de Son accroissement se fera en fonction

siples, mais elles ne sont pas comprises Ses dimensions ne sont pas imprévi-

dans sa planification.

Si on compare les villes canadiennes

tenure des terres et surtout à la répuest dû en grande partie au système de pérément empiriques et désuets. Ceci dues et de services publics sont désesbrogrammes de fourniture d'utilités publiavec Stockholm ou Copenhague, nos

et répondrait aux questions ci-dessous. blir une stratégie urbaine/non urbaine Le schéma ainsi obtenu servirait à étatration des populations dans les villes. facteurs positifs et négatifs de la concengrille qui indiquerait les contrastes des traintes nous permettrait de dresser une La compilation des diverses con-

user de leur autorité en matière d'exprognance des municipalités canadiennes à

priation et de contrainte.

l'harmonie.

de catégorie supérieure? urbain s'est-il fait sur des terres arables Dans quelle mesure le développement (p

> les conséquences et des proportions nais elles ont eu et elles ont toujours le Paris ou de Londres ne sont-ils pas Sanada ou d'ailleurs, actuelle ou an-On aimerait pouvoir citer une ville du le ses réalisations esthétiques et sociales. juartier (et la ville), à la fierté qu'on tire icipation aux décisions concernant le ux biens essentiels ou autres, à la par-

it les occupations, à la facilité d'accès

ıne liberté relative de choisir l'habitation

es commodités d'une ville sont dues à

as aussi bien que Helsinki. ilen mieux cotée que New York, mais noncés plus haut. Ainsi, Montréal est açon très relative aux quatre principes ne nous aurons à nous conformer d'une lue New York, Tokyo et Berlin. Il est clair le haute productivité et de richesse tels solifèrent dans les plus grands centres a malnutrition, la frustration et le crime cologiques très évidentes. La pollution, (quelques (quelquefois ethniques) eauvreté et l'oppression ont eu des oriune majorité souffrante? L'injustice, la lus à une minorité souffrante ou plutôt Aais les avantages d'Athènes, de Rome, alus hautes notes sur ces quatre points. senne, à laquelle on pourrait donner les

différents. liers sont régis par des facteurs très possiples bont chacun de ces cas particuadjacente. Par conséquent, les rapports noins encaissée et s'irradient sur la plaine cune traversées par une rivière plus ou oeg, Saskatoon et Edmonton sont chau pied de montagnes escarpées; Winnia'un bras de mer et s'arrête brusquement Vancouver étend ses tentacules le long usqu'à la rive sud du Saint-Laurent; scalifourchon sur deux îles et s'étale sur l'immense lac Ontario; Montréal est ans laquelle Toronto est située s'ouvre l'harmonie et d'efficacité. La demi-lune sauvinelles trop souvent dépourvues -ni fe selerur, esquages, rurales et inrès divers et permettent des contacts es paysages occupés par nos villes sont eurs formes et leurs processus 'sauretures urbaines et non urbaines,

ruraux et industriels. de contrôle sur les paysages sauvages, Elles accroissent sans cesse leur pouvoir

impossible à prévenir. plus, elle est trop onéreuse à éliminer et visuelle, acoustique) fait rage de plus en La pollution (chimique, physique,

famille. offrent peu de choix à la personne ou la titativement et qualitativement, elles Les habitations sont insuffisantes, quan-

grandes villes depuis le début de la réles caractéristiques de la plupart des La pauvreté et le chômage sont devenus

comme suit: les regroupant, pour fins de discussion, positifs et négatifs de ces six fléaux en Je vais essayer de classer les aspects

Jeurs formes et Jeurs processus; les structures urbaines et non urbaines

(səlliv səb 2) croissance, dimensions et structures

volution industrielle.

4) la planification et le zonage; 3) le logement;

6) les commodités et la récréation. p) Jes fransports;

Compte tenu des questions que sou-

(e appuyer sur les principes suivants: de leur interaction, nous pouvons nous lève chacun des points ci-dessus et

tifs et culturels, lieux de travail). merces, services publics, centres récréal'unité de voisinage (habitations, comd'autant de tonctions que possible dans compénétration et la compatibilité La diversité dans une ville consiste en la

facilité d'accès aux centres de secours. de pollution (y compris le bruit) et de la transport et les habitations), de l'absence ils disposent (y compris les moyens de entretien de toutes les commodités dont La santé des citadins dépend du bon

moyenne ou élevée. groupes de travail, à une productivité larité de ses services, à la compétence de L'efficacité d'une ville se voit à la régu-

> producteurs de bière et de boissons uniquement du papier recyclé; quelques importantes annoncent qu'elles utilisent plus austère. De nombreuses entreprises probablement à réaliser une économie l'érosion des bénéfices, nous chercherons «réaliste») pour les coûts cachés et tabilité plus acceptable (et peut-être plus prée et que nous proposons une compbrut pour évaluer une société bien équililanoiten fiubord el eup finational mesure que nous établissons un indice tions environnementales au Canada. A kecyclage est l'une des principales quesseil des sciences insiste sur le fait que le mique. Le rapport nº 14 (1971) du Confaut assigner à notre expansion éconobilités pour l'avenir et des limites qu'il notre manière d'envisager nos disponi-

à contaminer le tissu urbain. perfurber les zones sauvages et rurales et mosaïques régionales. Elle a tendance à d'une intégration fautive aux diverses L'industrie canadienne souffre donc

alarmante de matériel pouvant encore

gazeuses emploient les bouteilles con-

signées. Néanmoins, une quantité

6 Le Canada urbain

servir est gaspillée.

trop loin dans le passé. logiques, car cela nous ferait remonter de méthodologies spécifiquement écoplication aux centres urbains d'idées et u glions pas faire ici l'historique de l'apville en tant que lieu d'habitation. Nous à révéler des aspects insoupçonnés de la les zones urbaines commencent tout juste Les recherches écologiques concernant

Canada sont énumérées ci-dessous. flagrantes dans l'actuel réseau urbain du Quelques-unes des réalités les plus

superficie et en population. Les villes augmentent en dimension, en

ciale, à ce qu'il semble). par aucune direction régionale (ni provind'accroissement, et elles ne sont règles miques dans leur taux et leur orientation exclusivement à des impératifs éconode plan rationnel et obéissent presque La plupart se sont étendues sans suivre

> e) La législation sur l'utilisation de urbain. plus en détail au chapitre du Canada planification (nous examinerons ce sujet le zonage est la deuxième partie de la architecture ou une belle vue. En réalité, d'immenses réservoirs cachent une jolie tellement dans les régions rurales où gaus les grands centres urbains, mais pas Ce fait a été remarqué de plus en plus a servi à exclure certaines d'entre elles. plantation libre de nouvelles industries et -mi'l ètimil tnevuoz a eganoz el (b

ment pas à l'ordre du jour. Il est considéré 1) Le recyclage n'est malheureusealliance de la richesse et de la laideur. offrent encore le spectre d'une triste pegnoonb q gnfres centres industriels effluents. Mais Sudbury, Murdochville et industries ont grandement réduit leurs pilles de bois flottantes; de nombreuses de nos rivières ont été débarrassées des Jolis «parcs industriels»; quelques-unes de Tokyo, mais il a un certain nombre de usise de ce genre qui se trouve tout près risée que la principale installation Japoaussi impeccable, esthétique et désodologiques. Le Canada n'a pas de raffinerie industriel se donne des dimensions écoqu'en soit la motivation) que le design profit. Il y a de nombreux signes (quelle planifiée dont l'industrie automobile tire bas tous des avantages de l'obsolescence ettraie les industriels qui ne bénéficient anti-pollution à de vieilles machines Le coût de l'adaptation de dispositifs l'ensemble, insignifiantes et inefficaces. toujours en vigueur. Elles sont, dans à l'honneur, le régime des sanctions est sources et l'aménagement des terres sont positive où la gestion globale des res-Canada soit entré dans une phase plus exclusivement les abus. Quoique le de la «crise environnementale», à viser les premières années (à partir de 1965?) L'environnement a eu tendance, pendant

cuers' et il depend naturellement de de la question de l'élimination des déqu'il est coûteux. On ne peut le séparer économique, le plus souvent ignoré parce brincipalement comme un problème

rurales et urbaines. sauoz sal anab (aldmasna l'anab (as zones industriel. Les industries alimentaires sont assez importantes pour créer un paysage sed thos en selle'upsind, eagevues senos zones rurales, mais rarement dans des se trouvent aussi quelquefois dans des général dans des régions urbaines; elles d'articles de cuir qui sont situées en distilleries, les fabriques de textiles et dni vaut moins pour les brasseries, les dans des zones tout aussi diverses, ce seàutis tnos et papiers sont situées urbaines (Saint-Jean, Vancouver). Les Montréal, Burlington), dans des zones ab tea'l) sallairteubni sanoz sab anab dans des zones rurales (Thompson), Nord-Ouest, Mont-Louis, Gaspésie), sauvages (Norman Wells, Territoires du de distribution se trouvent dans des zones voirs, les produits pétroliers, les centres pétrole, les bateaux-citernes, les résera) Le paysage. Les raffineries de

b) L'emplacement. Les fabriques de conserves de viande, de farine de poisson et de pâtes et papiers sont aussi souvent qu'autrement situées de telle sorte que le vent porte leurs odeurs vers les centres urbains ou les villages. La décision concernant le choix du site et l'achat du terrain est d'ordre économico-technique et sociaux ou écologiques n'y jouent qu'un sociaux ou écologiques n'y jouent qu'un très faible rôle; or un facteur qui y tient très faible rôle; or un facteur qui y tient d'ordre politique, c'est-à-dire le conflit entre travailleurs et employeurs.

c) L'écologie humaine. On commence à en appliquer les principes, qui mence à en appliquer les principes, qui avaient été implicites dans les tentatives des travailleurs sociaux industriels. Mais nous avons peu d'informations à ce sujet. Il semble que personne n'ait évalué les réactions des travailleurs envers le cadre physique, biologique, social, économique et politique du milieu où ils travaillent, de leur lieu de résidence et du parcours qu'ils empruntent chaque jour. Il faut dresser un tableau précis de cet arrièredresser un tableau précis de cet arrière plan écologique qui serve de cadre à une étude de la santé physique et mentale et, par là, de l'épanouissement individuel et collectif.

Où en est l'industrie manufacturière au Canada relativement à son adaptation aux problèmes du milieu? On peut répondre d'une façon concise aux six impontantes questions ci-dessous concernant le paysage, le site, l'écologie nant le paysage, le site, l'écologie

a)
 b) sont situées les usinen: dans des paysages sauvages, ruraux, industriels ou urbains?

b)
A-t-on tenu compte des conditions du sol, de la direction du vent, de la proxi-mité de cours d'eau, de la végétation naturelle et du genre d'installation au moment de l'implantation de l'usine?

c)
A-f-on planifié l'habitat humain dans l'écosystème de travail? dans le milieu résidentiel? dans les écosystèmes récréstifs? dans l'écologie des moyens de transport?

d) L'usine occupe-t-elle une niche bien définie dans l'aménagement des zones municipales?

Applique-t-on des mesures préventives aussi bien que correctives? Est-ce que la direction tient compte de facteurs environnementaux dans sa planification?

Les sous-produits et les déchets font-ils l'objet d'un recyclage?

Des réponses au moins partielles à ces six questions pour sideront à pour faire

six questions nous aideront à nous faire une opinion.

> ur une main-d'œuvre stable et sur un er sur une quantité d'énergie constante, natières brutes, ils doivent pouvoir comploivent avoir un accès continu à des loigné). Les écosystèmes industriels lace ou provenant d'un endroit 'ègétales ou animales fournies sur itilisent des matières brutes minérales, xigences très semblables (qu'elles seb à tièdo senisu seb traqulq al eb noi les le cas, dans la mesure où l'implantaindustrie textile. A mon avis, tel n'est éunir la métallurgie, la distillerie et liverse qu'il peut paraître artificiel de L'industrie de fabrication est si sindre les buts économiques fixés. nettra de continuer l'expansion et d'atrogramme (pas trop coercitif) qui perxtrêmement inventif pour élaborer un in esprit scientifique et technique If faut une forte dose d'optimisme et

> estiaux, le train, l'abattoir, l'usine, l'enabrication (le pâturage, le parc à uoins l'une des phases du processus de iombreux écosystèmes où se déroule au luelles sont les retombées à chacun des cologique, nous devons nous demander, pérations d'un point de vue vraiment i nous pouvons examiner toutes ces exposer et finalement le livrer au client. orner, le cirer, l'emballer, l'annoncer, nodèle de la chaussure et l'exécuter, esar, couper et coudre le cuir, créer le apturer, le tuer, le dépouiller, tanner la lever un animal, puis à le nourrir, le érie d'opérations consistant d'abord à in magasin de détail termine toute une a vente d'une paire de chaussures dans eup sibnet , sesnegéb seldisf eb enfertne nent répandu sur une route voisine luit. L'extraction du gravier immédiate--orq nu'b notcessaires à la fabrication d'un prolie selon le nombre de processus succeselle révélerait la quantité requise d'éneraillée des zones industrielles du Canada, Si on pouvait dresser une carte dées autres industries citées plus haut.

ollueurs par excellence bien plus que

e début de la révolution industrielle, les

olisme affreux qui a fait d'elles, depuis

n de chaussures ont toutes un méta-

es raffineries, les fabriques de papiers.

ystème de transport et un marché sûrs.

repot, le magasin).

de paysages pittoresques, les émissions tion des terres arables, la contemplation planté les préoccupations concernant le l'obsession du transport rapide a sup-

physique et des activités communaubanlieues au détriment de l'exercice sab aganos al 1a ngisab al àonaulini a

pollution des zones urbaines; l'automobile est la cause principale de la (ə

augmentent constamment; menacent la santé physique et mentale neiges, de sorte que les dangers qui mobiles, aux motocyclettes et aux motoaux voitures de sport, aux canots autoapplique pas, surtout en ce qui a trait la vitesse sont inadéquates et on ne les lution par le bruit et la réglementation de les lois concernant la lutte contre la pol-

particulières; aérien, ferroviaire, routier, et les voitures concurrentes de transport maritime, de coordination entre les compagnies vinces, il y a peu de planification et peu à l'échelle du Canada et à celle des pro-

la marche est désuète. (4

comme une communication voulant tionnelle, même s'il se présente surtout avoir pour objectif l'expansion incondi-Mines et des Ressources, 1973) semble de l'énergie (ministère de l'Énergie, des concernant une politique canadienne par l'environnement. Le document officie canse des plus grands changements subi énergétiques sont probablement la Les industries des ressources

susciter la discussion.

la prédominance du transport particulier (p de gaz, le bruit; raccourcissement des trajets, la protec-

industrielle. port entre la pêche artisanale et la pêche équilibré. Il faut établir un nouveau rapgroupe tellement bien discipliné ou au stage industriel, ne forment pas un pêcheurs, ayant passé du stage artisanal n'est pas pour le mieux. De plus, les lacs et de la mer nous rappellent que tout L'épandage de pesticides, la pollution des aquatiques. La construction de barrages, avons tellement bien géré nos ressources domaine. If he s'ensuit pas que nous dni concerne l'étude scientifique dans ce le Canada joue un rôle important en ce douce et de mer) est un monde en soi, et res beches (la prise de poissons d'eau

jours aux autres utilisations des terres. dense, ce qui ne s'accommode pas touavisant et en devenant de plus en plus nades et les sentiers s'étend en se subroutes, les routes, les rues, les promenavigables, les voies ferrées, les autodien»). Le réseau formé par les voies beacho-social (le «grand dessein cana-(a mari usque ad mare) et sur le plan un rôle important sur le plan physique Les industries de transport jouent

barmi les principaux: mentale. On peut en citer quelques-uns certaine manière, à la crise environned'interrogation se rapportant tous, d'une borts présente de nombreux points Actuellement, la question des trans-

qevenir très graves; si elles ne sont pas atténuées, peuvent la cause de plusieurs perturbations qui, particulières dans la plupart des villes est en commun et les transports en voitures un mauvais rapport entre les transports (6

rues et des autoroutes; excessives et des encombrements des L'une des principales raisons de dépenses lières (une personne par voiture) est la sous-utilisation des voitures particu-

> Les industries extractives sont quatre principaux groupes précités. pective des industries canadiennes des Canada rural, en les situant dans la persaux chapitres du Canada sauvage et du tions, comme à celles posées plus haut, On peut mieux répondre à ces ques-

tamination des cours d'eau (comme dans peut très bien s'accompagner de la con-Intion de l'air (par le soufre et la silice) dans la restauration du paysage. La poltité une richesse qui n'est pas réinvestie duisent pas toujours en si grande quansont presque aussi laids, mais ne prorocs dénudés. De nombreux autres endroits lunaire avec sa végétation brûlée et ses ceunies, Sudbury a toujours un aspect guerre peut égaler. Après plusieurs déq'un nombre de cratères que seule une minière a eu pour résultat la formation sur tout son territoire. L'exploitation très nombreuses au Canada et s'étendent

l'exploitation des carrières et des fosses Un effet très semblable est produit par provincial de Gaspé). la rivière à saumon Matane, dans le parc

L'exploitation forestière au Canada est preuve d'un certain intérêt en ce sens. de ces terres, bien que l'Ontario ait fait pas de programme d'utilisation ultérieure Gardens), mais, en général, il n'existe (Butchart's Gardens, Queen Elizabeth stériles en Colombie-Britannique mise en valeur de ces zones laides et On peut voir de très bons exemples de grands puits plus ou moins remplis d'eau. l'ablation de terrasses et l'excavation de ment de moraines, de kames et d'eskers, urbaine ont eu pour résultat le nivellebesoins de la construction routière et milles de Toronto et de Montréal, les du sable. Dans un rayon de moins de 100 d'emprunt d'où on a retiré du gravier et

Mauricie). parc national (le parc national de la fortement déboisée est transformée en dneidne ben ikonidne dnand une zone rationnelles, mais leur application est actuelles sont plus scientifiques et plus Il est incontestable que les méthodes nu les traces d'un abattage inconsidéré. tellement dépassé, et on repère à l'œil mythe de boisés inépuisables n'est pas loin d'être la pire au monde. Mais notre

5 Le Canada industriel

bays. tants que les ressources indigènes au cipline collective semblent aussi importiques, la richesse du patrimoine et la disl'éducation et la culture, les liens poli-Face aux répercussions industrielles,

fournissent l'énergie. termédiaires qui assurent le transport et cles de cuir) et compte deux étapes in-(raffinage, distillation, fabrication d'artiniveaux de traitement ou de fabrication ploitation minière, pêches) à de multiples ant place (prélèvement de la tourbe, exde l'extraction de ressources naturelles mandes d'énergie sur une échelle qui va tions ont trait à l'accroissement des ded'énergie requise. Les principales distincgétales, animales) et de la consommation tenu des matières brutes (minérales, vétouche manifestement le plus, compte selon le niveau d'exploitation qu'elle être utile de considérer l'industrialisation Du point de vue écologique, il peut

nant l'industrie canadienne sont les sui-Les questions qui surgissent concer-

vantes:

¿əlquəsuə uos d'une industrie affecte-t-il le site dans Comment le choix de l'emplacement

Vient-il aux objectifs industriels? A quel point le réseau de transport con-(q

dustrie? des matières brutes utilisées dans l'in-Quelle est la répartition géographique

des travailleurs industriels? Quelle est la stratégie de la répartition

dustrie répand-t-elle la pollution? De quelle manière et à quel point l'in-

Quel est le rôle du cyclage et du recy-

Slainteubninatrii agelo

chement automatique de la hausse des La simple obéissance à un déclen-

bhiques dont quelques-uns ne sont déjà continuer sans avoir des effets catastrosources naturelles qu'elle ne peut plus une telle dégradation irréversible des resspontanée a causé un tel gaspillage et valeurs immobilières et à leur expansion

conserver et d'exploiter leur ferme; les fermiers n'ont plus les moyens de 9)

que trop évidents:

bonivus de tout charme; ments (par exemple dans des tours) déqui sont forcés de vivre dans des logeles habitants des villes et des banlieues

lités récréatives naturelles; pittoresques ou qui offrent des possibila destruction de sites entiers qui sont ()

d'édifices historiques; la destruction de sites, de monuments et

totale et quelquefois d'une culture très la réduction de la production agricole

bles par les gouvernements provinciaux La création de banques de terres araspécialisée.

la question des banques de terres. n'ont même pas examiné sérieusement cipaux ne se sont pas fixé d'objectifs et vernements fédéral, provinciaux et munibas s'empêcher de penser que les gouprojet réel ne se fait jour, et on ne peut du Canada. Mais, pour le moment, aucun trouve également dans d'autres régions lois et règlements de zonage qu'on redébordement et on a élaboré divers crit la construction dans les plaines de sens en Colombie-Britannique; on a pross'impose donc. Un début a été fait en ce

> plan de l'écologie et de la technique, e genre de vie est un objectif social. Sur t si on a l'appui de l'opinion générale. ient si la motivation nécessaire existe ıux, qui peuvent être élaborés uniqueınts programmes provinciaux et fédéinnications devrait faire l'objet d'imporurs moyens de transport et de comabyentions sélectionnées et par de meilréglementation des marchés, par des L'amélioration de ce genre de vie par

Les banques de terres arables et as de grandes difficultés. ue politique, sa réalisation ne présente ont des maux graves et si, du point de péculation et le manque de planification eut se justifier si on reconnaît que la ossible. Son économie à long terme ne telle planification est décidément

articulière. essus ne jouit pas d'une préférence nême si la vie rurale mentionnée cinodifications de nos valeurs sociales et dispensables, quelles que soient les ssortir nettement comme les solutions regroupement des fermes semblent

Shast aulq ali-thore ables et des habitations urbaines, et que lacements possibles des terres culti--me sel te stitoeque respectifs et les emiême superficie. Mais que sont actuelipporte plus qu'un champ de mais de est vrai qu'un immeuble de 20 étages cceptés pendant plusieurs décennies. romis imprévoyants que nous avons ilsons, examiner honnétement les comous eu conscience savoit ce due nous nmobilier doit être contrôlé. Nous deilson invoquée. Le libre jeu du marché oit plus continuer, quelle que soit la un sol hautement productif. Ceci ne nuent toujours à proliférer aux dépens erres agricoles de grande valeur et conilles canadiennes sont bâties sur des Beaucoup, sinon la plupart, de nos

11

Le **technologie agricole** a été appliquée en remplaçant l'ancien outillage agricole par du nouveau, présumé meilbeur parce qu'il fait gagner du temps, réduit le travail et le plus souvent exige moins d'aptitudes personnelles. Pour fequilibrer les gains et les pertes non seubement sur le plan économique, mais auss sur celui de la satisfaction personnelle, le bulldozer et la charrue ne pourraient le bulldozer et la charrue ne pourraient le bulldozer et la charrue ne pourraient le cas en Chine populaire)? La dichotonie artisanale /industrielle serait-elle un leurre que le «progrès» ne saurait in leurre que le «progrès» ne saurait justifier?

résultats positits et négatits (par exemple I'UNEP, que l'importance attribuée aux des conférences de l'UNESCO et de surtout des personnes qui ont assisté à de leur nocivité. Il est également connu, listes de substances à proscrire en raison océans. On établit périodiquement des vastes quantités de plancton dans les poissons de lac, ou de la disparition de tidne, de tortes doses de mercure par les de DDT par les pingouins de l'Antarcl'absorption de quantités surprenantes assez long sur le sujet, qu'il s'agisse de appétissantes. Nous en savons désormala parence succulente et dans des volailles tances toxiques dans des légumes d'apespèces animales, l'accumulation de subs ou le danger d'extinction de nombreuses eu pour résultat la mutilation, l'extinction ques utilisés en quantités industrielles a Leau et du sol par des produits chimi-L'empoisonnement de l'air, de

les charmes de la vie rurale traditionnelle soient incompatibles avec les loisirs et bien adaptés aux réalités du marché des procédés agricoles scientifiques il n'y a pas de raison de croire que nomie se développe continuellement, Par ailleurs, à une époque où la sociointégrale de grandes zones sauvages. une impasse, tout comme la conservatio de personnes à la retraite et constituer quement les collectivités improductives de vie villageois; cela peut attirer uniretour à l'ancien style rural et au mode dnére raisonnable de recommander un un autre genre de problèmes. Il n'est La qualité de la vie rurale présente au Canada, en Inde et aux Etats-Unis.

du DDT) n'est pas la même au Brésil et

L'inquiétude vis-à-vis le volume croissant des aliments importés peut orienter un changement dans la proportion de la migration de la population rurale vers la ville, et l'octroi de subventions plus importantes pour la production agricole.

Certains citadins qui n'aiment pas vivre à la ville vont s'installer dans les zones rurales, quelquefois au prix d'une forte perte de revenu. Ceci peut être assez important pour justifier une nouvelle planification et une nouvelle législation. Actuellement, ce sont peut-être là les

huit points principaux de la question rurale au Canada, et ils exigent une étude exhaustive de l'équilibre rural /urbain sous tous ses aspects, ainsi qu'une comparaison avec d'autres pays (plus particulièrement les pays scandinaves) où une expérience plus volontaire a été menée.

Pour le moment, quelques-unes des mesures qui permettraient une meilleure exploitation des zones rurales et résoudraient les huit points en question porteraient sur les sujets suivants. Les **possibilités d'utilisation des**

sols, comme l'indiquent les relevés et les cartes de l'Inventaire des terres du Canada, ont causé un certain nombre de conflits (dans les cas où de fortes valeurs ont été attribuées à plus d'une vocation) et grand nombre d'erreurs (dans le cas d'exploitations entreprises là où le potentiel est faible). Ces données sont prêtes à être informatisées, et nous pourrions donc entreprendre une évaluation sur une grande échelle, ou du moins un échantillonnage judicieux, des mosaïques échantillonnage judicieux, des mosaïques régionales les plus représentatives.

c)
Aucun paysage de grande étendue ne serait harmonieux sans l'élément rural.
Un inventaire des techniques et du

matériel agricoles nous fournirait l'arrièreplan nécessaire à la définition des conditions de vie rurale canadienne. Mais, encore une fois, sans faire d'étude approfondie et en ne tenant compte que des aspects les plus importants, nous pouvons nous baser sur les faits suivants:

Le rapport entre la répartition des populations rurale et urbaine s'est inversé entre 1871 (47.4% urbaine) et 1921 (47.4% urbaine) pour atteindre 52.5% en 1931, 73.5% en 1966, et on prévoit qu'il sera de 90% en l'an 2000.

La mécanisation de l'agriculture a marqué la fin de nombreuses fermes d'une superficie insuffisante, surtout celles de l'est du Canada où se pratique la culture mixte.

certaine conception des bilans commerciaux internationaux et des marchés concurrentiels a causé d'énormes réductions de la production agricole (surtout des céréales de l'Ouest).
 des céréales de l'Ouest).

L'invasion de l'électronique et de l'audiovision pour la diffusion de l'information ainsi que la mécanisation (voir b) cidessus) ont donné lieu à une forte migration de la main-d'œuvre rurale vers les centres urbains.

La proximité des zones urbaines en voie d'expansion a considérablement exposé les zones rurales au développement industriel, suburbain et urbain, souvent par le bisis de spéculations immobilières.

Ün changement possible du comportement canadien, par l'autarcie plus forte de l'individu ou de la famille, accroîtrait la valeur des petites propriétés très productives qui, autrement, seraient intégrées à un réseau urbain.

tière. Mais une action positive à long ferme, telle que l'aménagement de la voie maritime du Saint-Laurent (ardemment désiré par le Canada depuis les États-Unis 20 et carrément rejeté par les États-Unis jusqu'à la fin des années 60) a été très longue à se concrétiser.

Toute la question de la protection contre les inondations (surtout dans la région des Grands lacs et du Saint-Laurent), si dramatiquement reprise au printemps de 1974, et ses conséquences sur la pêche, l'agriculture, l'industrie et le développement urbain ont fait l'objet de nombreuses études. Il ne faudra rien de moins qu'une forte synthèse des faits connus, une meiltitative et une intégration plus étroite à une planification à buts multiples et à long terme pour que nous puissions prolong terme pour que nous puissions proposer une distribution plus efficace

4 Le Canada rural

des eaux.

La diversité des économies et des établissements ruraux du Canada coïncide en général avec le zonage bioclimatique. Les régions à vocation agricole ont une économie basée sur deux à trois siècles d'interaction entre les facteurs physiques et humains. C'est dire que les ressources et humains. C'est dire que les ressources d'un sol ont été exploitées en vertu des facteurs culturels et des tolérances du marché.

Comme c'est le cas pour les zones sauvages, la raison de conserver une certaine proportion de paysages ruraux stratégiquement situés peut se résumer par de delques principes de base:

d)

Cultiver et produire les aliments dont nous avons besoin sera toujours une nécessité, et c'est le fondement même de notre culture.

La vie rurale est l'une des principales options de la population et elle doit rester ouverte à un grand nombre de personnes.

Les parcs
On peut être très fier de l'organisation
des parcs fédéraux du Canada: son début
précoce, sa politique intelligente, le niveau de sa gestion, etc. Quant à celle des
parcs provinciaux, elle n'est pas toujours
aussi réussie, puisqu' à ce jour dans plusieurs parcs, l'exploitation forestière n'est
pas interdite, ni même l'exploitation minièrel On ne peut pas faire de généralinièrel On ne peut pas faire de généralisation pour les parcs municipaux et
privés.

La situation actuelle des parcs du Ganada indique qu'il n'y a pas eu de programme ni d'objectif concernant la préservation d'un parc dans chacune des principales régions naturelles. Or, certaines, notamment la forêt boréale, présentent un bel échantillonnage, contrairement aux Prairies, à la zone subarctique et surtout à la forêt tempérée de l'Est!

Il n'existe pas d'enquête détaillée sur

nos parcs nationaux ou autres. On n'a même pas entrepris l'étude systématique, selon une méthodologie uniforme, de tous les parcs (englobant toute la gamme des principales zones bioclimatiques du Ganada).

La Loi sur les parcs nationaux et les façons de l'appliquer ont grand besoin d'être révisées, ne serait-ce que parce qu'elles sont basées sur des principes de conservation aujourd'hui dépassés.

L'eau est une des ressources les plus abondantes au Canada. Étant donné qu'elle permet l'exploitation de l'énergie électrique, l'irrigation des terres fores-tières et cultivables, la pêche, et qu'elle peut être exportée, ses diverses utilisations sont depuis longtemps un sujet de controverse, et il n'est pas sûr que nous avons pris les bonnes décisions au bon moment.

(créée officiellement en 1909 par la signature d'un accord entre les État-Unis et le Canada et mise sur pied en 1912) a pu régler les controverses en matière de gestion quand les eaux passaient la frongestion quand q

e Canada sauvage es raisons de conserv

es raisons de conserver de grandes étenues sauvages au Canada sont les suiantes:

réserver un répertoire complet des dierses sortes de roches, de cours d'eau, e plantes et d'animaux;

isposer d'emplacements naturels pour es activités récréatives, artistiques et utres;

naintenir la possibilité de vivre dans la ature pour ceux qui le désirent;

spondre au besoin de faire des études upplémentaires d'écosystèmes non moifiés ou de les poursuivre. Nous devons nous demander quelle st l'utilisation principale des terres dans

Nous devons nous demander quelle st l'utilisation principale des terres dans hacune de ces principales zones et quels ont les régimes de propriété et d'améagement. Les principales questions sont se suivantes:

Luelle est l'étendue des terres apparteant à des organismes publics et à des articuliers?

tuelle est la variété des écosystèmes de hacune des régions principales?

Luelle est la répartition et la dimension e chaque groupe, principal et seconaire, d'écosystèmes régionaux, et jusu'à quel point sont-ils protégés?

y delle est l'utilisation des terres sauvages e chaque région et dans quelle mesure ont-elles accessibles?

nəibanaə dans l'environnement Problèmes et priorités Partie B

Vice-président Pierre Dansereau

humaine très clairsemée. même si elle abrite une population subi d'intervention directe de l'homme, Une zone sauvage n'a pratiquement pas

construite et peuplée. ploitables, tandis qu'elle est très peu surfout des végétaux et des animaux exformée par l'homme, mais on y trouve Une zone rurale a été grandement trans-

'sənb ou transformées par des moyens technimises en valeur pour être redistribuées, des ressources locales ou importées sont Une zone industrielle est un endroit où

transformée. entièrement construite ou profondément végétales ou animales, et elle est presque bins de ressources primaires minérales, Une zone urbaine n'a, pour ainsi dire,

Un échantillonnage de l'utilisation des est urbaine. que la grande majorité de sa population partie de son territoire est sauvage, mais des terres, on constate qu'une très grand ensemble, du point de vue de l'utilisation Si on considère le Canada dans son

où l'un de ces types principaux domine. urbaine. Mais il y en a beaucoup aussi industrielle, ou rurale, industrielle et sauvage, rurale et urbaine, rurale et harmonieux de zones sauvage et rurale, certaines constituant un assemblage existe une grande variété de mosaïques, terres dans tout le pays indique qu'il

taire des terres. guère nous permettre un véritable invengional, étant donné que nous ne pouvon dans un ordre thématique plutôt que ré-Il est plus à propos ici de procéder

> Or, la présente revue cherchera surtout consultatif canadien de l'environnement. qui préoccupe également le Conseil l'Environnement a entrepris cette tache, évaluations. En fait, le ministère de qu'une seule formule pour toutes les répertoire de méthodologies plutôt celui-ci nous impose pratiquement un milieu canadien. La grande diversité de espérons venir à bout des problèmes du Il serait utile d'en faire le bilan si nous

face aux crises actuelles et futures. consultatif canadien de l'environnement en tout cas, de la position du Conseil tablement des lacunes. Elle témoignera, tout le territoire, elle présentera inéviment, mais, en cherchant à embrasser à identifier les problèmes de l'environne-

canadien 2 Etats de crise dans l'environnement

problème. critique, un cas d'urgence ou un échéance particulièrement, une situation régions dans lesquelles existe, à brève canadien», et il se doit de repèrer les rapport sur l' «état de l'environnement Le présent document est une sorte de

En réalité, une telle division majeure s'agit de protéger ou d'aménager. contient les écosystèmes productifs qu'il cipaux, puisque la mosaïque régionale de les regrouper sous quatre titres prinfaire ressortir ces points critiques, c'est Il semble que la meilleure façon de

felles que décrites ci-dessous: ,* sənisdru tə səllər sindustrielles et urbaines ,* connaît partout des composantes sauest valable à l'échelle mondiale; elle re-

Ne cherchons pas à vérifier ici les environnementalistes. employer, des écologistes ou des actuellement, ou cherchent à composés d'ingénieurs) emploient le personnel sont presque toujours sociétés-conseils (dont la direction et organismes publics et de nombreuses répercussions écologiques. Divers d'un personnel qualifié pour évaluer les rattraper en ce qui concerne la formation universités ne font actuellement que se son vaste territoire. Les écoles et les blèmes critiques qui se manifestent sur encore assez pour faire face aux promondial, il n'en compte pourtant pas sa participation au Programme biologique de bons écologistes, comme en témoigne Canada a produit une quantité honorable compétents y est toutefois limité. Si le canadien. Le nombre de chercheurs convaincante de l'environnement la seule manière de faire une évaluation l'autre de ce vaste pays sous-peuplé est sages qui se présentent d'un bout à L'étude approfondie des nombreux pay-1 Introduction

logues, etc. pologues, aux architectes, aux socioingénieurs, aux géographes, aux anthroaussi aux physiciens, aux chimistes, aux acquis leur formation en biologie, mais gistes de l'école traditionnelle ayant professions, non seulement aux écolodésormais accessible à bon nombre de telle qu'elle est pratiquée maintenant, est Qu'il nous suffise de dire que l'écologie, leur importance sur le plan professionnel. in seèupilqmi senildiosib seb anoitinitèb

des expériences très valables. teurs écologiques se sont engagés dans faisant. Nos planificateurs et nos évaluacinq dernières années est plutôt satisrience. Le dossier de nos réalisations des sommes en train d'apprendre par l'expéde l'environnement. Au Canada, nous plusieurs disciplines vers la planification forme pour faire converger le travail de c'est qu'il n'existe pas de modèle unidisciplinaire. Ce qui est certain aussi, uniquement par une participation intersoudre les problèmes environnementaux Une chose est certaine: on peut ré-

che actuellement en cours. *Cette répartition des terres fait l'objet d'un projet de recher-

(iii)
Éducation écologique. Jusqu'à quel
point le ministère de l'Environnement
doit-il diriger et formuler les perceptions
de l'environnement?
(iv)

La préparation annuelle d'une analyse de l'état de l'environnement canadien.

(v)
La continuité de l'effort pour assurer un

La continuité de l'effort pour assurer un mécanisme de collaboration entre le conseils provinciaux de l'environnement. Le premier pas sera une réunion conjointe organisée par le Conseil consultatif canadien de l'environnement.

7 Initiatives futures

Nous prévoyons que les efforts des groupes de travail se continueront et seront même accrus là où il le faudra. Les sujets suivants seront vraisemblablement mis en évidence au cours de la troisième année du conseil:

le poids qui leur revient dans les conmatière d'environnement pourront avoir waudne avoné de connaissances) en Est-ce due nos connaissances (ou notre dans toutes ces entreprises majeures? de réaliser des développements viables et international. Le Canada a-t-il la force d'ordre économique, politique, national dans chaque cas dépendent de questions fication et du design. Or, les décisions les prévoit pas dès le début de la planipotentiellement désastreuses si on ne chacun d'entre eux sont massives et Les retombées sur l'environnement de davantage, sur une période de 20 ans). l'ordre de \$50 milliards et probablement financiers majeurs (chacun d'eux de de ces projets suppose des engagements développement à grande échelle de l'un charbons de l'ouest du Canada. Tout pel arctique, etc.), la gazéification des (par exemple la mer de Beaufort, l'Archides ressources pétrolières de l'Arctique mineux de l'Athabasca, les programmes nucléaire, le programme des sables bitul'étude, soit le programme de l'énergie majeurs sont en voie d'exécution ou à l'heure actuelle, quatre projets canadiens La question énergie-environnement. A

(ii)
La participation du public à des questions touchant la qualité de l'environnement. Les bénéfices écologiques étant
souvent intangibles et perçus dans un
avenir lointain, par quels moyens le public
peut-il ou doit-il exprimer ses préoccupations au sujet d'interventions dont les
bénéfices non-écologiques sont tangibles
et immédiats? Quels sont les «droits»
et immédiats? Quels sont les «droits»

barer les diverses options énergie-

mécanismes peuvent permettre de com-

sidérations politico-économiques? Quels

La liste suivante est typique de ventail des sujets qui ont été examinés r le conseil:

estuaires (leur productivité, leur veloppement, leur préservation et la sponsabilité de leur aménagement);

i) () ()

ancement;) financement de groupements d'intérêt blic;

rôle de la recherche universitaire et son

coptions énergétiques. En plus de la Revue annuelle et de nalyse de l'état de l'environnement nadien, les publications suivantes du nseil, qui recevront une vaste diffusion, us l'espérons, sont sous presse ou le vont bientôt:

écanisme des évaluations environneantales pour le Canada. Rapport n° 1, rrier 1974.

mémoire intitulé Une éthique de privonnement-élaboration et implitions. Rapport n° 2. (Nous nous prosons de publier d'abord ce texte pour s de discussion professionnelle et sorique et d'en produire par la suite e version vulgarisée et une autre pour e nersion vulgarisée et une autre pour

dre et désordre dans l'environnement madien. Étude n° 1. Voici une version borée de la partie B de cette revue nuelle, accompagnée d'une bibliopphie exhaustive et réalisée par Dansereau à la demande du conseil. Le conseil a également préparé des cuments de travail pour usage interne. a documents, qui concernent par sa documents, ne se prêtent pas nivironnement, ne se prêtent pas plication.

environnement?

(iii)
Le Groupe de travail sur la régie interne
a examiné les objectifs, l'organisation, l
fonctions (service, recherche, information publique, etc.) du ministère fédéral
de l'Environnement. Ces considérations
embrassent l'organisation actuelle et se
opérations, de même que les domaines
qui ont été négligés, les initiatives
futures, etc.

Chacun des groupes de travail a énoncé des problèmes précis qui, en raison de la recherche détaillée qu'ils récessitaient, ne pouvaient pas être résolus immédiatement par le groupe lu même. C'est pourquoi, dans ces cas, le conseil a accordé des contrats à certain de ses membres et à des experts de l'extérieur. Comme exemples de tels contrats, citons les travaux qui se rapportent à l'éthique de l'environnement, à l'évaluation des impacts environnementaux et à l'examen d'une propositio sur l'indice de la qualité de l'environsur l'indice de la qualité de l'environ-

6 Travaux du conseil

avec le ministre et le ministère. de clarifier et de consolider ses relation atteint. Le conseil s'est aussi préoccupe reusement une sorte de consensus a ét occupé maintes heures de débat. Heul'environnement», et cette question à dans l'élaboration d'une «éthique de pien conscient aussi de sa responsabili la discussion et l'analyse. Le conseil es continuent d'être un point de mire pour implications écologiques d'autre part, tion de l'énergie d'une part, et leurs la conversion, la distribution et l'utilisaentre les bénéfices sociaux qu'apporter vie. Par exemple, les liens nécessaires de prospérité et de bonne qualité de la offrent les meilleures chances de survie objectifs nationaux et internationaux qu voir la recherche concomitante des rôle consultatif du conseil et de promou seil. Le but principal est de favoriser le majeure aux réunions plénières du conconstituent normalement la contributio travail et les rapports des experts invités Les rapports intérimaires des groupes d

Afin de mieux accomplir sa tâche, le conseil a mis sur pied trois groupes de travail connus sous les noms de Groupes de travail sur les fondements, sur les initiatives spécifiques, et sur la régie interne. La composition de ces groupes est donnée en appendice. Le vice-président sert de coordonnateur. Le domaine propre à chacun est brièvement délimité comme suit:

(1)

(ii)renouvelables, etc. d'usage croissant de ressources non de demandes grandissantes d'énergie, les faits d'augmentation de la population, techniques, particulièrement éclairées par aux politiques économiques, sociales et nationales de l'environnement, articulées donc de la mise en marche de politiques de l'environnement. Ce groupe s'occupe qui assureront un aménagement viable et sur les bases théoriques concomitantes les impératifs économiques et sociaux, écologiques qui ne laissent pas de côté vironnement basée sur des principes sur l'élaboration d'une éthique de l'enpolitiques, le groupe s'est surtout penché une base viable à la formulation des terme du gouvernement. Afin de fournir chant les buts et les politiques à long s'est adonné à l'étude de questions tou-Le Groupe de travail sur les fondements

Canada», etc. de la qualité de l'environnement au dans le golfe Saint-Laurent, un «indice ment et la praticabilité de superports électrique de la baie James, l'emplacetour du projet de développement hydrol'évaluation des études entreprises aupétrole et du gaz naturel dans l'Arctique, Mackenzie, le forage à la recherche du environnementaux, le corridor du le problème de l'évaluation des impacts pien spécifiés. Donnons comme exemples d'intérêt national affectant des milieux les questions d'importance immédiate et spécifiques a tourné son attention vers Le Groupe de travail sur les initiatives

De temps en temps, le conseil a tenu des séances d'information avec des fonctionnaires du ministère de l'Environnement sur un certain nombre de sujets tels que l'organisation interne du ministère, l'évaluation des impacts environnementaux de divers projets, des exposés sur les forages dans la mer de exposés sur les forages dans la mer de les aspects écologiques de l'environnement, les aspects écologiques de la route du Mackenzie, etc. Ce furent là des occasions d'échanges très ouverts et productins de conseil et le ministère.

ronnement est sérieusement menacé. temps en temps à des endroits où l'envisemplables sur place auront lieu de vironnement est très forte. Des examens probabilité d'un dommage grave à l'envisite du conseil dans une région où la de marée et de vent. C'était là la première ticulièrement dans certaines conditions ces eaux périlleuses est très élevée, pardéversements importants de pétrole dans deviendra un superport. La possibilité de les supercargos lorsque Eastport (Maine) blèmes de navigation qui confronteront ries et une observation directe des prode l'Office des recherches sur les pêcheelle a comporté une visite au laboratoire s'est déroulée au laboratoire Huntsman; ticulièrement enrichissante, puisqu'elle La réunion de St. Andrews a été par-

5 Organisation

membres et du secrétaire intérimaire. dent, du vice-président, de deux autres L'exécutif actuel se compose du présidu conseil et de faciliter ses travaux. d'avoir une évaluation courante du rôle cace avec le ministère, et, en général, spéciales, de maintenir une liaison effisacceptible d'entreprendre des fâches chargé de préparer l'ordre du jour, août 1973, de former un Comité exécutif fortement engagées. Il a été décidé, en l'attention de personnes par ailleurs très l'environnement qui soient dignes de autant que possible à des discussions sur table que ces réunions soient consacrées régulières du conseil. Or, il est souhaisasisse sab noiteradàrd al anab atajus Il faut considérer un grand nombre de

Arthur Porter **sident**

3 Membres

Les membres du conseil sont nommés par le ministre. À l'avenir, le mandat sera de trois ans. L'identité et l'affiliation professionnelle des membres anciens et actuels du conseil sont données dans l'appendice. Un large éventail de disciplines et d'occupations est représenté et les membres ont été recrutés dans tout le Canada.

travail ont fonctionné très efficacement. intérêts, le conseil et tous ses groupes de la sociéte. En dépit de la diversité de ses tude de préoccupations et ces liens avec reflète dans sa composition cette amplibas d'expertise spécialisée, le conseil brasser tous les domaines et ne se targue public. Quoiqu'il ne prétende pas eml'éducation et de la recherche et avec le contacts avec le monde de l'industrie, de sociales et économiques ainsi que des vaste gamme de sciences naturelles, connaissances et des expériences sur une Afin de remplir ces rôles, il nous faut des s'ouvrant à une perspective nationale. visées locales ou régionales tout en côtières, etc.) obligent le conseil à des exemple les Grands lacs, les régions taines régions géographiques (par sont souvent caractéristiques de cerl'environnement et le fait que les crises disciplinaire de la problématique de

4 Réunions du conseil

Six réunions du conseil et six réunions de l'année. l'exécutif ont eu lieu au cours de l'année. Depuis mars 1974, les réunions du conseil sont devenues mensuelles, bien que l'une d'elles ait été annulée à cause d'une grève des transports. Toutes les assemblées, à l'exception de celle tenue à St. blées, à l'exception de celle tenue à St. Andrews (Nouveau-Brunswick), en août 1973, ont eu lieu à Ottawa. La procédure habituelle consiste en une precédure habituelle consiste en une prediscussion en profondeur sur un sujet discussion en profondeur sur un sujet le jour suivant, pour remplir un ordre du jour très étendu et varié.

Dans l'interprétation de ce mandat, le conseil reconnaît comme essentiel le caractère plutôt confidentiel des échanges avec le ministre, particulièrement en ce qui a trait aux réponses spécifiques à des demandes de la part du ministre et aux demandes de la part du ministre et aux

qui a trait aux réponses spécifiques à des demandes de la part du ministre et aux commentaires sur le fonctionnement et l'organisation interne du ministère.

Toutefois, le conseil considère qu'il peut avoir un rôle important à jouer dans l'éducation du public et dans la sensibili-sation aux problèmes de l'environnement, et que ses rapports sur certains sujets doivent être publiés et largement diffusés

Le conseil se voit lui-même, et le ministre y souscrit, comme un organisme non ministériel et comme une source de conseils et d'informations objectifs pour le ministre, le ministère et le public. Afin d'assumer pleinement ce rôle, le conseil doit représenter des points de vue fort doit représenter des points de vue fort universitaire, soit ceux des divers secteurs universitaire, industriel et public de la vie canadienne.

qualité de l'environnement au Canada.

seil comporte une vue d'ensemble sur la

obbortun que la revue annuelle du con-

dans tout le Canada. Ainsi, il semble

Dans la poursuite de ses objectifs, le conseil est engagé dans trois sortes d'activités distinctes:

études de problèmes généraux ayant des retombées et des effets à long terme sur l'environnement; b)

études de problèmes courants de l'en-

vironnement ou études des travaux et de l'organisation du ministère, entreprises de l'initiative du conseil lui-même; c) études entreprises à la demande du ministre ou demandées en son nom par

des fonctionnaires supérieurs du

ablissement du conseil 1970, le ministre des Pêch

vice-président. nistre, qui choisit aussi le président et inze membres furent nommés par le ation et la composition du conseil. 10 mai 1972, que furent annoncées la t, et c'est à la première séance, tenue onnement fut approuvée par le Cabinseil consultatif canadien de l'ennseil. En mars 1972, la création d'un la composition et de la tâche d'un tel nsultations furent entreprises au sujet l'Environnement prit naissance et des cours de l'année suivante, le ministère ppliquer à l'environnement canadien. ller sur les problèmes et les politiques sounes pien informées, pour le connt, interdisciplinaire, composé de ucn qn pesoin d'un groupe indépenrêts déclara publiquement être con-1970, le ministre des Pêches et des

ici l'essentiel du mandat du conseil:

but du Conseil consultatif canadien de nvironnement est de conseiller le nistre de l'Environnement sur: les questions que le ministre pourrait lui poser:

l'état de l'environnement et ce qui le lui poser;

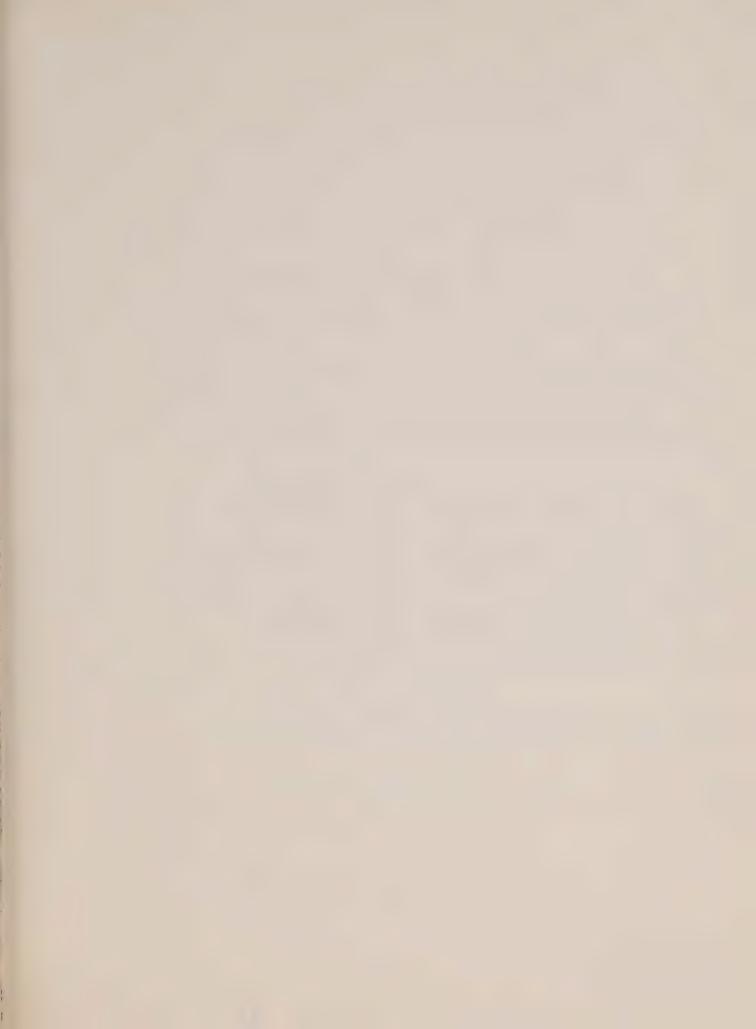
menace;
les initiatives à reconnaître comme
brioritaires par le gouvernement fédéral conjointement avec les provinces;
l'efficacité des interventions du ministère de l'Environnement dans la
restauration, la préservation ou
l'amélioration de la qualité de l'environnement, compte tenu des trois
niveaux d'administration (fédéral,
niveaux d'administration (fédéral,
niveaux d'administration (fédéral,
niveaux d'administration (fédéral,

du développement rationnel des

lon la disponibilité des fonds, le conil aura le pouvoir d'établir des comités des groupes de travail composés de s membres ou d'autres personnes argés d'étudier et de préparer des ports dans des domaines qui intéresnt particulièrement le conseil.

səəxnossə.

ministère.





476 f Jelliul 1974

Le ministre de l'Environnement Ottawa (Ontario)

Monsieur le ministre,

Nous avons le plaisir de vous faire parvenir la Revue annuelle du conseil pour l'année 1973-1974.

L'ouvrage se divise en deux parties: dans la première (A), le président traite en termes généraux des activités de l'année; quant à la seconde (B), elle consiste en un rapport du vice-président, que nous pourrions appeler un exposé sur l'environnement canadien en 1974.

La Revue annuelle pour 1972-1973, la première année d'existence du conseil, se présentait sous la forme d'une communication personnelle du président au ministre. Sa publication ne semblait pas justifiée car c'était tout simplement un exposé des procédures d'information du conseil (par des membres du ministère de l'Environnement) et de la structure permetation à ce dernier de faire face à une variété de problèmes environnementaux, et ce, surtout pour vous conseiller sur plusieurs points. Toutefois, comme le conseil a fait beaucoup de progrès l'an dernier, il conviendrait à notre avis de publier la Revue annuelle pour 1973-1974. Nous souhaitons ainsi porter à l'attention du peuple canadien les réalisations du pays en matière de maintien de la qualité de l'environnement, d'une part, et, d'autre part, quelques-uns des problèmes d'importance actuellement à l'étude ou qui seront bientôt sujets à examen.

Nous espérons que vous serez satisfait de ce rapport, le premier d'une série que publiera le conseil dans le but de faciliter le travail du ministère et de renseigner le public sur la façon dont il remplit son mandat.

Veuillez agréer, Monsieur le ministre, l'expression de nos sentiments les plus respectueux.

Arthur Porter, président

Pierre Dansereau, vice-président

Conseil consultatif canadien de l'environnement juillet 1974

(Nouvelle-Écosse)
Grand Pré
M. Norman H. Morse

M. James P. Nowlan Halifax (Nouvelle-Écosse)

M. J.B. MacInnis

Les initiatives spécifiques

M. E.F. Roots Conseiller scientifique Ministère de l'Environnement Ottawa (Ontario) Secrétaire intérimaire

M. J. Keith Fraser
Direction de la politique scientifique
Ministère de l'Environnement
Ottawa (Ontario)
Secrétaire associé

M. Philippe Garigue Université de Montréal Montréal (Québec)

M. Guy R. Legault Ville de Montréal Montréal (Québec)

M. Joseph B. MacInnis Undersea Research Limited Toronto (Ontario)

M. Ian McTaggart-Cowan Université de la Colombie-Britannique Vancouver (Colombie-Britannique)

M. Donovan F. Miller The Canadian Fishing Co. Ltd Vancouver (Colombie-Britannique)

> M. Arthur Porter Université de Toronto Toronto (Ontario) Président

M. Pierre Dansereau Université du Québec Montréal (Québec) Vice-président

M. Donald A. Chant Université de Toronto Toronto (Ontario)

M. H.E. Duckworth Université de Winnipeg Winnipeg (Manitoba)

M^{IIe} I. Moira Dunbar Ministère de la Défense nationale Ottawa (Ontario)

Groupes de travail

M. N.H. Morse Président

M. D.A. Chant M. G.R. Legault

М. Н.Е. Duckworth

M. P. Garigue

stnamabnot sal

M^{II}

• I.M. Dunbar

M. N. Beaupré

M. D.F. Miller

M. J.P. Mowlan

La régie interne

Président

1973-1974 Revue annuelle

Conseil consultatif canadien de l'environnement

Les demandes de renseignements au su jet des travaux du conseil doivent être adressées au Secrétariat Conseil consultatif canadien de l'environnement a/s Ministère de l'Environnement Ottawa (Ontario) cont disponibles, peuvent être obtenue aont disponibles, peuvent être obtenue d'Information Canada ou du centre de distribution des publications d'Information Canada ou du Centre de distribution des publications Ottawa (Ontario)

sujets d'importance et d'intérêt général. temps en temps des rapports sur d'autres l'environnement au Canada, et de qui comprend un sommaire de l'état de solutine conseil publie une revue annuelle des déclarations et des rapports, au betonctions; il prépare des commentaires, le progrès et le développement de ces vironnement et sur la politique à suivre; il des questions ayant une portée sur l'enprend des études et des rétrospectives sur Pour remplir son mandat, le conseil entretère fournit un secrétariat permanent. membre du conseil; cependant, le minisdu ministère de l'Environnement n'est toutes les régions du pays. Aucun agent pects de la vie canadienne et viennent de personnel, qui représentent les divers asministre, et des membres choisis à titre seils sur les ressources, qui conseillent le bres, Il comprend les présidents des conre couseil se compose d'au plus 16 mem-

Le Conseil consultatif canadien de l'environnement a été créé en 1972 par décision du Cabinet fédéral pour conseiller le ministre de l'Environnement sur: lui poser; lui poser; l'état de l'environnement et ce qui le menace;

les initiatives à reconnaître comme prioritaires par le gouvernement fédéral conjointement avec les provinces;

l'efficacité des interventions du ministère de l'Environnement dans la restautère de l'Environnement dans la restautation, la préservation ou l'amélioration de la qualité de l'environnement.

Conseil consultatif canadien de l'environnement

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Dr H.E. Duckworth University of Winnipeg Winnipeg, Manitoba

Miss Moira Dunbar Defence Research Establishment Department of National Defence Ottawa, Ontario

Mr Irving K. Fox University of British Columbia Vancouver, British Columbia

Mr Eric Gourdeau Courville, Québec

Dr Ross H. Hall McMaster University Hamilton, Ontario

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Dr F. Kenneth Hare University of Toronto Toronto, Ontario

Mr Guy R. Legault Ville de Montréal Montréal, Québec

Mr Donovan F. Miller The Canadian Fishing Co. Ltd. Vancouver, British Columbia Chairman, Canadian Fisheries Advisory Council

Dr Norman H. Morse Dalhousie University Halifax, Nova Scotia

Dr James P. Nowlan Halifax, Nova Scotia

Dr Arthur Porter University of Toronto Toronto, Ontario

Mr Robert G. Rogers Crown Zellerbach Ltd. Vancouver, British Columbia Chairman, Canadian Forestry Advisory Council

SECRETARIAT

Dr E. Fred Roots Environment Canada Ottawa, Ontario Executive Secretary

Dr J. Keith Fraser Environment Canada Ottawa, Ontario Associate Secretary



de l'environnement

December 31, 1975

The Minister Department of the Environment Ottawa, Ontario

Dear Minister:

We have the honour of transmitting the Annual Review of the Council for the year 1975.

This is the second formal report of Council since its inception in 1972. During the period covered by this Annual Review (July 1974 to December 1975), we have examined a number of significant issues which we feel warrant the serious attention of the Canadian public as well as that of administrators charged with the maintenance of the quality of the environment. Accordingly, we have reviewed these issues briefly in this report as well as describing the activities of the Council.

In publishing this Annual Review, we reaffirm our contention that the Department of the Environment should intensify its efforts to define policies regarding the environmental problems facing Canadians. At the same time, we hope that it will help to provoke public interest in the acceptability of the present and future use or misuse of our natural resources.

Yours sincerely,

Ian McTaggart-Cowan Chairman

Philippe Garigue Vice-Chairman

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council was established in 1972 by decision of the federal Cabinet, to advise the Minister of the Environment on:

- such matters as may specifically be referred to it by the Minister;
- the state of the environment and threats to it;
- the priorities for action by the federal government or by the federal government jointly with the provinces;
- the effectiveness of activities of the Department of the Environment in restoring, preserving or enhancing the quality of the environment.

The Council is composed of up to sixteen members. It includes the Chairmen of the resource councils advisory to the Minister, plus members at large who serve in an individual capacity and are drawn from a wide cross-section of Canadian life and from all across Canada. Officials of the Department of the Environment are not members of the Council; however the Department provides a continuing Secretariat.

To carry out its functions the Council undertakes studies and reviews of matters of environmental concern and policy, holds regular meetings to consider progress and developments with regard to these concerns, and prepares comments, statements and reports as appropriate. The Council publishes an *Annual Review* which includes a summary of the state of the environment in Canada, and from time to time reports on other matters of general interest and importance.

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary, Canadian Environmental Advisory Council, c/o Department of the Environment, Ottawa, Canada K1A OH3

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TERMS OF REFERENCE

- 1. The purpose of the Canadian Environmental Advisory Council is to advise the Minister of the Environment: a) on such matters as may be specifically referred to it by the Minister; and on b) the state of the environment and of threats to it; c) priorities for action by the federal government jointly with the province; d) the effectiveness of departmental activities in restoring, preserving or enhancing the quality of the environment; bearing in mind the divided federal, provincial, territorial and municipal jurisdictions and the necessity for orderly economic development of the country's resources.
- 2. The Chairman and the other members of the Council shall be appointed by the Minister for terms not normally exceeding three years, may be re-appointed, and shall represent the Chairmen of resource councils advisory to the Minister, and members at large.

- 3. The Department of the Environment shall provide a secretary.
- 4. The Chairman, in addition to presiding at meetings, shall be responsible for developing and directing the work of the Council.
- 5. The Council shall meet not less than twice per annum at predetermined times, and at such additional times as may be required at the call of the Chairman.
- 6. Subject to the availability of funds, the Council shall be empowered to establish committees or working groups from among its members and others to study and report on fields of special interest to the Council.
- 7. The Department of the Environment shall provide a budget to cover the operational costs of the Council. The budget shall include provision for payment of ordinary transportation costs and living expenses plus per diem allowances of seventy five dollars.

PUBLICATIONS

Annual Review 1973-1974. Part A: Activities 1973-1974. By Arthur Porter Part B: Problems and priorities in the Canadian environment. By Pierre Dansereau.

An environmental impact assessment process for Canada. Council Report No. 1. February 1974.

An environmental ethic - its formulation and implications. Council Report No. 2. January 1975. By Norman H. Morse. Preface by Pierre Dansereau. Foreword by Donald A. Chant.

PART A: ACTIVITIES 1975

Ian McTaggart-Cowan

1. Meetings of the Council

During the period covered by this report - July 1974 to December 1975 - Council held 14 meetings, as well as 11 meetings of the Executive Committee and two meetings of the Priorities Subcommittee. All full Council meetings were held in Ottawa except for one in Vancouver and one in Burlington. In most cases, the meetings occupied two full days.

2. Membership

Dr. Joseph B. MacInnis resigned from the Council in 1974. The Minister appointed Dr. F. Kenneth Hare and Mr. Eric Gourdeau in November 1974 and Mr. Irving K. Fox and Dr. Ross H. Hall in May 1975, bringing the membership up to its complement of sixteen. Mr. Robert G. Rogers became a member in January 1975 when he was appointed Chairman of the Forestry Advisory Council.

In May 1975, the terms of the Chairman, Dr. Arthur Porter and the Vice-Chairman, Dr. Pierre Dansereau were concluded and the Minister named Dr. Ian McTaggart-Cowan and Dr. Philippe Garigue to these positions for a three-year period.

A list of members and their affiliations may be found in this report. Through this membership, Council continues to reflect the expertise, interests and regional representation necessary to adequately advise on the broad range of environmental problems.

3. Role of the Council

Council re-examined its role and developed a statement more clearly reflecting changing relationships and problems.

- i) Identify important environmental problems, concentrate on the definition and analysis in principle of their biological, physical and social aspects and generate advice on the best routes to be followed toward their solution.
- ii) Identify and define environmental problems of a more global nature:

a) which Canada shares with neighbouring countries: and

- b) which affect Canadians as members of mankind.
- iii) Receive requests and instructions from the Minister on environmental issues and actions, and respond with advice and recommendations.
- iv) Anticipate and identify emerging issues and bring them to the attention of the Minister.
 - v) Examine the implications or effects of government action or inaction on the development of perceived and coherent government policy.
- vi) Keep abreast of current problems so as to be readily responsive to requests from the Minister.
- vii) Evaluate the processes of environmental assessment and control so as to be able to identify apparent successes—and failures and to propose improvements in their procedures and coordination.
- viii) Produce, as part of an annual report, an overview of the successes and failures of environmental activities in Canada, the lessons and the perceived issues.

4. Activities of the Council

At the invitation of Council, a number of specialists attended meetings to brief Council on developments in critical areas or to explain the position of citizens' groups. These included discussions of the environmental hazards of offshore drilling in the Canadian Arctic and the associated programs and public involvement (Dr D.H. Pimlott and Mr M.K. Vincent, Canadian Arctic Resources Committee, and Ms Mary Collins, Pallister Resources Management Ltd.); development of the Athabasca Oil Sands (Dr W.R. Trost, Chairman, Alberta Environment Conservation Authority); the environmental impact of expanded development of Western Canada coal resources (Mr G.T. Page, Director, Coal Association of Canada); environmental management practices in Great Britain (Mr E. Goldsmith, editor, The Ecologist); and Environmental monitoring along the Mackenzie Highway (Mr J. Riddell, Department of Indian and Northern Affairs).

Officials of the Department of the Environment briefed Council on a variety of topics, including the actions taken under the Environmental Assessment and Review Process (Dr R.R. Logie and Mr V.V. Spence); the departmental involvement with the James Bay Power Development (Mr B. Cook and Ms Kathy Arkay); a proposal to support citizens' groups from public funds (Mr B. Bélovic); the difficulties of funding multidisciplinary research groups (Dr M.C.B. Hotz and Dr H.F. Fletcher); and the role of the Advanced Concepts Centre (Dr R.W. Durie).

Dr P. Dansereau and Dr F.K. Hare presented illustrated lectures on environmental aspects of New Zealand and Australia respectively, and Dr J.K. Fraser gave Council an illustrated report on a reconnaissance on behalf of Council along the Mackenzie Highway.

Funding of Citizens' Groups

Council considered the matter of financial assistance to voluntary organizations concerned with environmental quality, and made recommendations that groups considered for assistance should be largely voluntary, independent, show evidence of efficient use of funds and demonstrate more than a local concern. Council was unanimous in supporting the concept of federal support.

Environmental Assessment and Review Process

Council maintained a close scrutiny of the activities and effectiveness of the Environmental Assessment and Review Process (EARP) and forwarded a detailed memorandum of advice to the Minister. This recommended changes strengthening the authority and independence of the Chairman of EARP, insisting on a more comprehensive inclusion of projects with significant potential impact and enlarging the role of the public in the review process.

Beaufort Sea Offshore Drilling

Council continued to express concern that research had been insufficient to properly assess the risks involved in permitting an offshore drilling program in 1976. Council kept upto-date on developments but did not feel sufficiently informed to make specific recommendations.

Joint Meeting of Environmental Councils

To ascertain problems of mutual concern and to determine how to minimize duplication of effort, a meeting of representatives of provincial councils concerned with giving advice on the environment met with the Canadian Environmental Advisory Council in Ottawa in February 1975. All provinces except Newfoundland were represented. Following presentations from each participating body, from which it was apparent that the advisory and consultation process varies greatly between provinces, seven topics of particular concern were examined: land use planning and management; public participation in decision-making; communication between advisory bodies; environmental education; the urban environment; environmental quality indices; and population and its distribution as an environmental problem. Three topics were identified for discussion at the next meeting: environmental assessment procedures; social and economic consequence of continued economic growth; and energy conservation. The Canadian Environmental Advisory Council was encouraged to examine the problem of toxic substances, nuclear power generation and special environmental problems arising from Canadian geography, climate and geology.

Fraser River Delta/Estuary

At a meeting in Vancouver in June 1975, Council arranged briefings by the staff of several divisions of the Department of the Environment, of the Fraser River Harbour Commission, of the Westwater Research Centre, of the Greater Vancouver Regional District Planning Department and of the Vancouver Harbours Board. These briefings were of value not only to Council but to the participants, many of whom were unaware of research being conducted by other agencies. The meeting thus assumed the status of a seminar, bringing diverse viewpoints into focus for what appeared to be the first time.

Probably in no other part of Canada do so many conflicts in usage arise as in the Fraser River delta and estuary. Fish and wild life habitats are reduced by transportation and industry needs. Sewage disposal reduces water quality, placing additional pressure on fish stocks. Urban growth is transgressing on the fertile farm lands of the delta. Dyking for flood control changes the pattern of sedimentation. Airport expansion involving extension of an airstrip into the estuary would alter its capacity to sustain marine life and would add to noise pollution in residential areas. Council concluded that our basic knowledge is insufficient for adequate planning and prudent decision-making, especially in view of existing and prospective development pressures. Recommendations resulting from this meeting included the urgent requirement to identify and delimit areas in the delta/estuary which are of critical environmental importance; the investigation of environmental consequences of development; the establishment of an intergovernmental group to carry out these studies; and that environmental impact assessment procedures be followed in developments affecting the estuarine resources.

Canada Centre for Inland Waters

Council met at the Canada Centre for Inland Waters at Burlington, Ontario in November 1975 where CCIW staff briefed Council on the programs and activities of the Centre. The opportunity was taken to invite provincial and industrial specialists to discuss urban environmental problems. Council was made aware of concern about the lack of graduate programs in environmental engineering, the control of atmospheric pollution in southern Ontario and the jurisdictional problem of the mercury contamination of lakes in northwestern Ontario.

5. Future Activities

Council will continue to examine the environmental aspects of, among others, these important topics: policy making and public participation; energy supply and demand; the proliferation of nuclear power generating stations; wild lands; northern research and resource development; estuaries; urban agglomerations; and the transboundary impact of developments in Canada and the U.S.A.

PART B: SIGNIFICANT CANADIAN ENVIRONMENTAL PROBLEMS

J.P. Nowlan

Introduction

The Canadian Environmental Advisory Council, in November 1974, appointed from its members a working group to formulate environmental problems and priorities within the range of its terms of reference and budgetary restraints. A list of recommendations was prepared in accord with Council instructions:

To consider the suggestions already made by members and others concerning future topics for research or comment; assess them for relevance, feasibility and cost: assign priorities; and recommend an appropriate program for the Council for the Calendar year 1975.

Three categories of research topics were apparent to the working group:

- a) Reactive studies, undertaken in response to a request from the Minister or because of an urgent development;
- b) Studies of particular environmental concern to Canada; and
 - c) Studies of global or general environmental concern.

Subject areas covered a broad range - energy, transportation, urban-rural relationships, wild lands, resource use, the philosophy of environmental problems, education, policy-making and problems of divided jurisdiction. Some of these are obviously beyond the capacity for action by Council, others are so complex that the best that can be done is to devise questions that should be answered, but in some cases it was considered that effective action could be initiated during 1975.

Eleven topics for preliminary study were finally selected by the working group for presentation to Council as objectives for the year:

- 1. Environmental aspects of the design, construction and operation of northern roads and pipelines, with particular reference to the Mackenzie River Valley.
- 2. Review of the environmental aspects of large scale exploitation of the Athabasca Oil Sands.
- 3. Environmental aspects of the James Bay power development, including transmission of the power.
 - 4. Estuaries significance, use, and policy.
- 5. Environmental aspects of nuclear power development in Canada.
 - 6. Urban/rural land use planning.
 - 7. Land use policy for wild lands.
 - 8. Algae culture and use in Canada.
- 9. Effect on Canada of man-made changes in the stratosphere, and a study of appropriate policies for dealing with such changes.
- 10. Environmental aspects of the choices in Canada with regard to energy conservation and reduction in energy demand.
 - 11. The nature of environmental policy-making.

It was recognized that complete solutions could not be reached for any of these eleven problem areas with the time and funds available to Council. Because of these constraints, it was proposed that for all of the programs (except algae culture), preliminary studies be conducted to determine:

- a) The magnitude and exigency of the problem;
- b) Agencies or staff best equipped to undertake definitive work;
- c) The questions that remain unanswered, and more important, the right questions to ask; and
- d) Compromises that might be necessary to attain the most satisfactory results.

Summaries of these ten problem areas, some including recommendations for action, are contained in this part of the Annual Review, to reflect some aspects of the work of the Canadian Environmental Advisory Council and to emphasize to the Canadian public, the Department of the Environment and to other responsible agencies, a few of the issues considered to be demanding of serious attention.

1. Northern roads and pipeline construction and operation

In view of the apparent urgency of this subject, a rather full set of recommendations with discussion of the relevant problems was presented. These problems are caused in great part by the slow rate of natural recovery of biosystems in the Subarctic and Arctic and by the slow rate of bacterial degradation of waste materials. They relate to terrain erosion, waste disposal, stream biota, wildlife, air pollution, aesthetics, effect of increased human activity, including tourism, and routing to minimize adverse environmental effects. Specific recommendations to ensure environmental control included:

Timing: a northern pipeline environmental code should be written and approved before commencement of any construction.

<u>Control</u>: a single authority should be created by the federal government to control and supervise all construction aspects, including preparatory work.

Operations: ensure that an appropriate mechanism is established between the Departments of the Environment and Indian and Northern Affairs to environmentally monitor and evaluate, in co-ordination with the Territorial Governments, the construction and operation of the pipeline.

Public Relations: encourage and support public scrutiny of the on-going construction through an independent public body.

Route: if the line is to carry Alaska gas, every effort should be made to have the route located south of the Yukon river.

Wildlife protection: urge the establishment of a wildlife refuge extending two miles on either side of a right-of-way.

Council followed up these recommendations by directing several questions to the Environment Protection Service. These asked for clarification of the working concept as to responsibility for codes or guidelines; methods of ensuring that the necessary constraints are adequate; methods of enforcing standards of construction and operation; and provision for training and authority of inspectors and of field workers and foremen. Council suggested that such training must extend to the instructors themselves.

Recommendations as to highway construction restraints followed similar but less detailed lines as the imminent approval of gas pipeline construction gave this aspect of northern development greater immediate priority. While Council retained certain reservations about the potential environmental hazards and social problems inherent in the proliferation of pipelines and roads into a corridor, it was considered that these concerns had been expressed as strongly as Council's mandate permitted.

2. Energy conservation

The task force working on this subject has prepared a preliminary report which, after discussion and approval by Council, was forwarded to the Minister, as a guide to appraising recommendations to be presented by an interdepartmental task force.

The report pointed out that many of the most pressing environmental problems of today result from the profligate use of energy, energy which by and large is currently derived from sources which are non-renewable in terms of human existence. Whether or not we like it, shortage of these energy sources will force upon us a more prudent use at least unless and until renewable energy sources are developed for our demands.

Both the physical and social aspects of energy conservation are treated in the report. Reduction in the use of energy will affect both the Canadian environment and the economic and social well-being of Canadians as a consequence of

- a) direct effects on the environment of a lower rate of energy production and use, and
- b) the economic and social changes accompanying a shift to less energy-intensive technology and the necessary production and consumption of a different pattern of goods and services.

The paper analyzes energy conservation philosophy, direct environmental effect in use and transportation, the range of possible social consequences, and different means of reducing energy use. It evaluates current policies and action and recommends certain actions.

From an engineering point of view, the first limitation is exhaustion of the stored energy-producing materials, whether fossil fuels or uranium, including its by-products. The second is the extreme inefficiency of our utilization of these sources, with only about 30% of the available energy from fuel reaching the consumer, and for most electrical equipment only about 4% actually being utilized. Automobiles are by far the least efficient method of transportation as regards energy, but are used in preference to rail or other public transport. Energy conscious design for industrial plants could reduce requirements by 10% or more. Utilization of urban waste as fuel, combined with utilizing waste heat from generating stations, could save more of our fuel resources. More efficient ways of storing energy could make renewable energy sources such as winds, heat pumps or tides, more attractive. Very limited research has been done on energy storage methods. Most changes to more energy efficient methods will require capital outlays that have not been justifiable at immediate past energy cost levels.

Present trends in energy use in Canada, if projected to the year 2000, would see a quadrupling of our demand. It appears certain that constraints on availability of energy sources will preclude such growth. Thus the need is to plan for lower energy usage with a minimum disruption of society and a capital outlay that can be met.

Hardships, or even a reduction in the quality of life, due to energy conservation will depend on the extent of current excess use that can be reduced painlessly on the extent of technological change to offset shortages, and on the individual's attitude towards the consequences of conservation. There will undoubtedly be changes in types of consumption and probably reduced pressure on environmental systems.

Beneficial environmental effects that may follow could include a reduced rate of development of Arctic fuel resources, decreased highway construction (but probably more railway rebuilding), slower addition of land for airports, lower pollution levels, and modification of industry and home locations to avoid traffic jams, i.e., less concentration in cities.

Labour intensive industry will grow at the expense of capital, which probably means fewer goods and services will be available for the same energy output, thus a decline in real income. Lower levels of investment are probable, accompanied by a growth in the labour component of production and a lowering of the labour pool in services. Inflationary pressures will probably increase at least temporarily as people try to maintain their past habits of consumption, but in the longer run an anti-inflationary effect is likely.

A decline in the emphasis on social services is to be expected, but greater utilization of persons marginal to the labour force will be needed. Changes in relationships between the federal government and the provinces will be inevitable. Strains on labour relations will result, but eventually there will have to be more individual self-sufficiency.

Though many of these changes are foreseeable, their magnitude is not. Much will depend on the means by which energy constraints are introduced. As with wage and price controls, absolute fairness is impossible to attain; the best that can be done is to mitigate real hardship.

In brief, the report points out that energy conservation is necessary, and that it carries significant implications concerning the nature of our future economy and society. The degree of scarcity is not known nor is the public reaction to the consequence.

There is urgent need to select the most appropriate policy instruments and administrative methods to make such reduction in energy use tolerable. Issues that will emerge must include: priorities for development of energy sources, priorities for the end use of energy, development of methods for equitable rationing if necessary, and the determination of public vs. private roles in energy supply. The public must be given the facts and be conditioned to adjust personal ends to the available means.

Canada may have more room for manoeuvering than have most countries, except those situated over major oil fields. This is fortunate, but it should not lead to an euphoric disregard of the results of continuing the current growth in energy demand.

3. Estuaries

The task force on estuaries was charged with examining the important role of estuaries and other coastal zone areas in Canada's economic and social life. The report should indicate their vulnerability, jurisdictional problems, and methods by which satisfactory management may be achieved.

The necessity in many instances for trade-offs in the use of estuaries was recognized. Harbour facilities and industry may be incompatible with recreational activities; sewage disposal may ruin shellfish operations; drainage from farm and factory may ruin estuaries as nurseries for many fish species or even completely vitiate biological productivity. Furthermore, responsibility for management of estuarine waters may be divided among federal, provincial and municipal governments to the detriment of the wellbeing of all.

As there are hundreds of estuaries in Canada, it was decided that a description of the situation pertaining to a dozen or so typical ones would be the initial approach. Selecting type estuaries has proven to be difficult as the pertinent factors are exceedingly diverse, and such factors have been studied in only a few cases. In fact, the lack of knowledge of physical and biological conditions of most of these areas is in itself a convincing reason for proposing an intensive study of at least those which are most affected by man's activities.

Variations include the degree of delta formation, salinity of water and its seasonal variability, sediment load in quantity and type, tidal action, wind and current action, present uses, chemistry of the fresh water influx, depth of water, extent of estuarial influence, species of fish utilizing the sheltered embayments, shellfish and crustacean life, and waterfowl usage. These factors are quite apart from present and probable future usage of the coastal zone and drainage area by man.

Continued work was requested following the preliminary report. This is taking the form of compiling known physical, chemical, geological, social and political aspects of a number of more or less typical estuarine zones. These were selected partly on a geographic basis, partly because some or nearly all of the data listed above are available. For most Canadian estuaries meaningful knowledge is insufficient.

One recommendation in the preliminary report stems from the obvious lack of planning or effective management of these areas, whether due to divided jurisdiction or to lack of recognition of their importance to our national wellbeing. It was proposed that management should be entrusted to Estuary Authorities or Crown Corporations empowered to plan future usage and development so as to attain maximum economic and environmental benefits, the two being in many cases complementary. Such corporations can take a much longer view than can elected governments, particularly if there is a divergence of interest between levels of government as to short term benefits. Council plans to complete a report to the Minister by the end of 1976.

4. Environmental policy-making

A pilot report on environmental policy-making in Canada was prepared for Council and accepted as a basis for a study in greater depth. This report points out that in Canada not only does public policy-making decide major guidelines for the future, aiming at achieving what is in the public interest by the best possible means, it must follow the wishes of the people within the guidelines of the British North America Act, and for environmental matters it must be guided by the best scientific data available.

The Canadian Department of the Environment is conceived of as the instrument for initiating a firm policy decision on environmental matters, but the pilot report identifies the difficulties inherent in its organization as a department with managerial and staff responsibilities. Nevertheless, rapid changes in technology, chaotic urban growth, deterioration of the Arctic and of coastal waters, all make coherent environmental policies vitally necessary.

It is suggested that there is an urgent need for the Department of the Environment to produce a long term policy which will be a guide to the resolution of all too frequent crisis situations calling for what are essentially makeshift actions. Past criteria for definition of objectives for organizational structure, and for specifying measures, are now too narrow and have become inappropriate. An increased ability to anticipate environmental change and its consequence is needed.

5. Changes in the stratosphere

A preliminary report on this matter, synthesizing the present knowledge of the upper atmosphere and the possible hazards due to man's activities, along with a report on research presently underway in Canada and elsewhere, was presented to Council for consideration. The Atmospheric Environment Service has carried out most of the Canadian research, is keeping in touch with foreign work on this subject and has briefed the Minister. A more comprehensive report due shortly from a federal interdepartmental task force will enable Council to prepare advice for consideration by the Minister.

In brief, the threat is to the ozone (0_3) content of the stratosphere. Under natural conditions formation of 0_3 is roughly in balance with its dissociation. Lessened amounts of ozone allow greater penetration of ultraviolet radiation. The incidence of skin cancer and of mutations due to genetic changes will be increased not only for man but for the whole ecosystem.

Variations with latitude and diurnal variations due to rapid streaming of the upper atmosphere are sufficiently great that man-made modifications are still within the measured normal variations. Trends can be projected, however, and unless new forces produce an equilibrium similar to the present one, the ozone content of the stratosphere will be diminished appreciably within the next few decades.

Man-made causes stem from several trends. First recognized was the threat from high flying aircraft, from which nitrous oxide emissions enter into the stratosphere and promote dissolution of ozone. Barring large fleets of supersonic aircraft, the percentage change due to this activity is relatively small. A more important source of nitrous oxides is the increasing application of nitrogen fertilizer used in agriculture, especially

when applied to acid soil. Such soils are becoming more widespread with the increasing incidence of acid rainfall due to SO_2 discharges from industrial plants. Effects of nitrogenous fertilizer can be alleviated by use of adequate lime.

Free chlorine due to dissociation of certain chlorofluoro carbons (freons) by ultraviolet radiation in the stratosphere is also an enemy of ozone. The use of these inert gases in refrigerants, as propellants, in plastic form and as solvents has been increasing rapidly, and, being chemically inert, they eventually rise to the stratosphere where free chlorine is emitted as dissociation takes place. Up to 14% reduction in ozone is suggested if use of these materials continues at their present rate. The United States is the largest user of these compounds and its government has reacted vigorously, both to restrict usage of the more dangerous types and to stimulate research to determine the limits of the problem.

There is also reason to suspect that methyl bromide, used as a soil fumigant in tobacco and cotton fields, may give rise to bromine compounds in the stratosphere which will react to destroy ozone.

In short, life stability may depend on the ozone layer of the stratosphere. A lessened quantity of ozone may affect genetics, may lead to an increase in melanoma, and may have significant effects on world climate. Research is still insufficient to determine the magnitude of the problem, but sufficient evidence is already available to suggest that it would be wise to proceed with great caution in the use of any substances or processes that may adversely effect the stratosphere.

6. Nuclear power

The study group has submitted to Council the following outline of the proposed study of the state of knowledge concerning environmental hazards of nuclear power plants.

- 1. Risk as a fact of life
- 2. Distinctive features of the CANDU System
- 3. Regulatory bodies
 - (a) Role of the Atomic Energy Control Board
 - (b) Role of the International Committee on Radiological Protection

- 4. Biological effects of radiation
 - (a) Present knowledge of biological effects
 - (b) Method of measuring radiation doses
- 5. Adequacy of environmental information relating to
 - (a) Uranium mining and fabrication
 - (b) Discharge of radioactive material from routine plant operation
 - (c) Effects of cooling water
 - (d) Management of spent fuel
 - (e) Heavy water production plants
- 6. Some future considerations
 - (a) Growth of industry
 - (b) Fuel processing
 - (c) Ultimate storage of radioactive wastes

As increasing numbers of nuclear plants would appear to be an inevitable development, this analysis of their probable effect on environment, and of environmental criteria which should be considered, should be of interest to the responsible agencies.

7. Urban/rural land use

While recognizing the insidious and complicated nature of the problem of uncontrolled land development in the urban fringelands, Council has found it difficult to develop a study which does more than identify it as a widespread situation demanding serious attention. The main role of Council will be to catalogue the gaps in present land use planning and policies, and ensure that these discrepancies are known to and being actively considered by the responsible agencies. A number of pertinent questions worthy of further study were tabled.

- 1) Why have three major urban areas developed?
- 2) Does rapid population growth preclude effective planning?
- 3) How effective are existing laws and the three levels of government agencies in coping with the urban environment? Do they work at cross purposes and do they anticipate future developments?
- 4) How does urban concentration affect the quality of life for the individual?

- 5) What are the objectives of urban planning?
- 6) How do urban area demands affect the country both near to the city and across the nation?
- 7) What is the role of citizen groups?
- 8) What is being done about working environments?
- 9) Can industrial areas be made aesthetically satisfying?
- 10) How do urban areas affect recreation?

8. Wild lands policy in Canada

Council examined some of the issues requiring policy decisions. It was recognized that broad policies operating across Canada may not adequately reflect local conditions; these will in most cases require policy advice from knowledgable indigenous persons. The objective should be to ensure the maximum benefit from relatively undeveloped areas, and tangible and intangible values and changes in popular value systems must be weighed against costs.

Should wild lands be open to the public and, if so, to what degree? Any extensive public use requires facilities, policing, transportation and guides. When these amenities are provided, is the area wild any longer?

Should resource extraction be permitted, and if so, will adequate guidelines be available? Here the question of conservation versus preservation comes into play.

Problems of control and responsibility due in part to multigovernmental jurisdiction must be settled. Rules for behaviour of individuals and organizations are needed, including the activities of research scientists.

9. James Bay Power development

Council has examined several reports prepared by staff members of Environment Canada and expects to present recommendations early in 1976.

The chief problems are those related to river diversion and reservoir flooding. Northward-flowing waters from the Caniapiscau River watershed are to be diverted into La Grande system, producing a reservoir 3,740 km 2 in area. Water from the Eastmain River is also to be diverted into La Grande River, forming a reservoir of 1,313 km 2 at an elevation some 300 m lower than the upper reservoir.

Airports, roads, camps and transmission lines will all tend to modify the character of the country, but the environmental effects of these should be foreseeable and manageable. What is not known is the effect on ice formation and indigent species of the La Grande River into James Bay, the effect on nursery stocks of fish due to reduced Eastmain River flow, and of expected water temperature changes. Some climatic modification can also be expected with warmer fall weather and lower summer temperatures. Silt content of the streams will be markedly reduced and with it nutrients in the water.

Various mitigative procedures have been suggested, but none has yet been given the force of legal sanction. The recommended procedure during construction is to maintain a minimum flow equal to the lowest recorded flow in each river during the period of reservoir filling. It would seem impossible to avoid some ecological disruption of the lower part of the Eastmain River, but maintenance of some flow is considered necessary.

Much work is obviously still needed before the optimum environmental plan can be prepared and coordinated with construction and power needs. This work, of course, should have been well in hand prior to commencement of construction, and it would appear that time for preparing definitive and acceptable environmental standards may be too short.

10. Athabasca Oil Sands development

The potential environmental problems arising from intensive exploitation of the Oil Sands are in a different category from Arctic construction problems in that provincial as well as federal jurisdiction is involved. The federal presence is required because of possible water and air pollution across a provincial boundary and because of partial federal financing.

Reports have been prepared for the Science Council of Canada and for the Environmental Council of Alberta by independent engineering firms. Constraints are primarily administered by the Alberta Department of Environment which has the responsibility to set standards for oil sands plants that minimize environmental impact. No master plan for regional development appears yet to have been produced, and certain facets of environmental concern must be defined more specifically. These include definition of zones within which mining is prohibited, permissible siting of plants, strict regulation of tailings pond construction, study of the near surface geology so that liquid tailings are not discharged into permeable aquifers, restriction of stripping to that needed for near term mining, maximum allowable use of Athabasca River water, and control of stream diversion. Much research also needs to be done on methods of separating the bitumen and clay from liquid tailings, reduction of stack emissions, handling of muskeg, permissible limits of bitumen in surface waters, and procedures for land reclamation.

It is expected that the population of Fort McMurray will grow to 100,000 as production increases. Planning for the human element is so far in the hands of a separate provincial ministry and has not been coordinated with environmental requirements. Such lack of coordination is disturbing, and it is obviously desirable that a mechanism be found by which the various federal and provincial authorities can work closely together.

Conclusion

This report does not pretend to suggest that these issues are the only, or even the most significant, environmental problems facing Canada. Nor were they the only matters to which Council devoted attention in 1975, as demonstrated in Part A of this Annual Review. These ten issues nevertheless are representative of the broad scope of problems inherent in the Canadian environmental mosaic and their solutions will continue to be of major concern to the Canadian Environmental Advisory Council.

On estime que la population de Fort McMurray passera à 100 000 à mesure que la production augmentera. Jusqu'à maintenant, la planification en fonction de l'élément humain a été assumée par un ministère provincial séparé et n'a pas été vérifiée en regard des plorable et il est évidemment souhaitable de faire intervenir un mécanisme pour que les diverses autorités fédérales et provinciales puissent travailler en étroite collaboration.

Conclusion

Les auteurs du présent rapport n'entendent pas suggérer que les questions mentionnées sont les seuls, voir même les plus importants problèmes auxquels le Canada doit faire face. Elles n'étaient pas non plus les seules auxquelles le Conseil a prêté attention en 2975, comme il est indiqué dans la partie A du présente Revue connecti est indiqué dans la partie A du présente Revue représentatifs des problèmes très variés inhérents à la mosafique environnementale canadienne. Leur résolution continuera d'être environnementale canadienne, Leur résolution continuera d'être des préoccupations principales du Conseil consultatif canadien de l'environnement.

réservoir. Même s'il semble impossible d'éviter un certain bouleversement écologique du cours inférieur de la rivière Eastmain, on juge nécessaire le maintien d'une fraction du débit.

Il faudra encore mettre beaucoup de travail pour que le plan écologique optimal soit préparé et puisse cadrer avec les besoins de construction et d'énergie. Evidemment, les travaux auraient dû être en bonne voie d'exécution à cette fin avant le début de la construction et il semble que le temps dont nous disposons maintenant pour préparer des normes environnementales définitives et acceptables soit insuffisant.

10. Exploitation des sables bitumineux de l'Athabasca

Les problèmes environnementaux que peut poser l'exploitation intensive des sables bitumineux sont d'un ordre différent de ceux que peut causer la construction dans l'Arctique du fait qu'interviennent les compétences provinciale et fédérale. Le gouvernement fédéral y participe en raison de la part des fonds qu'il a fournis et pour des fins de surveillance de la pollution éventuelle des eaux et de l'air fins de surveillance voisine.

arnsi que les mêthodes de récupération des terres. les teneurs maximales acceptables de bitume dans les eaux de surface, reduction des degagements aux cheminées, le traitement du muskeg, bitume et de l'argile que contiennent les résidus liquides, la coup de recherche s'impose aussi sur les méthodes de séparation du l'Athabasca, et le contrôle de la dérivation de cours d'eau. Beaublissement de l'utilisation maximale acceptable de l'eau de sèchement aux besoins terminaux de l'exploitation minière, l'êtapas dans les couches aquifères perméables, la restriction de l'assurface visant à voir à ce que les résidus liquides ne se rendent sévère de l'aménagement de mares à résidus, l'étude géologique de le choix d'emplacements d'usines acceptables, la réglementation la délimitation de zones où l'exploitation minière serait interdite, doivent être définies plus particulièrement. Celles-ci comprennent n'ait vu le jour, et certaines préoccupations environnementales semble que, jusqu'à présent, aucun plan cadre d'aménagement régional bitumineux afin de minimiser les incidences environnementales. Il de fixer des normes applicables aux usines de traitement des sables incombe au ministêre de l'Environnement de l'Alberta qui est chargé sociétés de technologie indépendantes. L'imposition de restrictions du Canada et du Conseil environnemental de l'Alberta par des Des rapports ont été préparés à l'intention du Conseil des sciences

L'exploitation des ressources doit-elle y être permise et, dans l'affirmative, des lignes directrices suffisantes pourront-elles être établies? Intervient ici la question de la conservation par rapport à la préservation.

Des problèmes de régie et de compétence en raison partiellement du partage des juridictions doivent être résolus. Il est un besoin de principes directeurs applicables tant aux particuliers qu'aux organismes, et même aux chercheurs.

9. Aménagement de la baie James

Le Conseil a étudié plusieurs rapports préparés par des membres du personnel d'Environnement Canada et entend présenter des recommendations au début de 1976.

Les problèmes principaux ont trait à la dérivation de cours d'eau et à la constitution de réservoirs. On fera dériver les eaux coulant en direction nord, dans le bassin versant Caniapiscau, jusque dans le réseau La Grande, créant un réservoir d'une superticie de 3 740 km². Les eaux de la rivière Eastmain doivent également être dérivées pour se déverser dans La Grande rivière, créant un réservoir de l 313 km² à une élévation inférieure d'environ 500 m a celle du réservoir d'amont.

Les aéroports, les routes, les établissements humains et les lignes de transmission seront tous susceptibles de modifier le paysage, mais leurs effets environnementaux devraient être prévisibles et maftrisables. Cependant, nous ignorons les effets sur la formation des glaces et les espèces indigènes de l'augmentation du volume de la Grande rivière à son embouchure dans la baie James, l'effet sur la frande rivière à son embouchure dans la baie James, l'effet sur la reproduction des stocks de poisson, de la réduction du débit de la rivière Eastmain, et les conséquences des changements de température des eaux. On peut s'attendre à des modifications climatiques telles que le réchauffement du temps d'automne et l'abaissement des températures d'été. La teneur en limon des cours d'eau sera sensible températures d'été. La teneur en limon des cours d'eau sera sensible ment réduit et, par conséquent les substances nutritives de l'eau également.

Diverses méthodes d'amortissement de ces incidences ont été suggérées, mais aucune n'a reçu jusqu'à maintenant force exécutoire. La procédure a suivre recommandée, au cours de la construction, consiste à maintenir un débit minimal égal au débit le moins élevé qui ait été observé dans chaque rivière durant la période de constitution du

et les trois paliers d'organismes actuels en matière de gestion de l'environnement urbain? Y a-t-il un recoupement d'objectifs et peut-on prévoir les tendances futures?

- 4) Quels sont les effets de la concentration urbaine sur la qualité de la vie du point de vue individuel?
- 5) Quels sont les objectifs de la planification urbaine?
- 6) Comment les besoins des agglomérations urbaines influent-ils sur les régions environnantes et sur l'ensemble du pays?
- 7) Quel est le rôle des groupes de citoyens?
- 8) Quelles mesures sont prises au sujet des conditions matérielles de travail?
- 9) Les parcs industriels peuvent-ils satisfaire aux normes esthétiques?
- 10) Quels sont les effets de l'agglomération urbaine sur les loisirs?

8. Politique des terres inexploitées au Canada

Le Conseil s'est penché sur certaines questions nécessitant des décisions en matière de politique. Il a été reconnu que les politique, ques générales en vigueur dans tout le pays ne tiennent pas suffisamment compte des conditions locales; pour remédier à ce problème, il faudra faire appel aux conseils de résidants locaux compétentes. L'objectif doit consister à tirer un maximum de profit des régions relativement inexploitées en pesant les valeurs tangibles et intangibles, ainsi que les changements de l'échelle de valeurs et intangibles, par rapport au coût.

Les terres inexploitées doivent-elles être accessibles au public et, dans l'affirmative, dans quelle mesure? Toute utilisation publique des terres appelle des installations, de la surveillance, des moyens de transport et des guides. Ces modalitée étant assurées, les terres sont-elles toujours à l'état sauvage?

- Connaissances actuelles sur les effets (g)
- Méthode de mesure des doses de radiation (q) sanbigotorq
- trait a: Suffisance de l'information environnementale ayant
- de l'urantum L'exploitation minière, et la fabrication (g)
- Les effets de l'eau de refroidissement (0) Le rejet de substances radioactives des usines (q)
- La gestion des combustibles utilisés (p)
- Les usines de production d'eau lourde (e)
- Quelques autres considérations
- Expansion industrielle (9)
- Traitement des combustibles (q)
- Emmagasinage optimal des déchets radioactifs (2)

compte, devrait être d'un vif intérêt pour les organismes responsables. L'environnement, et des critères écologiques dont il doit être tenu de croître, la présente analyse de leurs effets probables sur Puisqu'il semble inévitable que le nombre des centrales continuera

7. Utilisation urbaine et rurale des terres

. səəsoqəb nombre de questions pertinents méritant une étude détaillée ont été organismes responsables et étudiées activement par eux. Un certain et de s'assurer que ces lacunes soient portées à l'attention des planification et des politiques actuelles de l'utilisation des terres, rôle principal du Conseil sera donc d'énumérer les lacunes de la de la situation et de la nécessité d'une attention intensifiée. Le étude dont les résultats dépasseraient l'établissement de l'ampleur trophes, le Conseil a jugé qu'il lui serait difficile de mener une l'amenagement arbitraire des terres dans les zones urbaines limi-Conscient du caractère subtil et compliqué du problème que pose

- sont-elles développées au Canada? Pourquot trois principales régions urbaines se (1
- la planification efficace? La croissance rapide de la population empêche-t-elle (7
- Jusqu'à quel point sont efficaces les lois existantes

(b) Rôle du Comitê international de pr radiologique

pour la réfrigération la propulsion, soit sous forme de plastique ou en tant que dissolvant se répand rapidement. Puisqu'ils sont chimiquement inertes, ils atteignent tôt ou tard la stratosphère où ils se dégradent en libérant du chlore. On estime que la quantité d'ozone pourrait subir une diminution allant jusqu'à 14% si l'emploi de ces substances se poursuit au rythme actuel. Les Etats-Unis sont les principaux usagers de ces composés, et le gouvernement américain a pris de fortes mesures tant pour restreindre gouvernement américain a pris de fortes mesures tant pour restreindre l'usage des substances les plus dangereuses que pour stimuler la recherche en vue de déterminer l'ampleur du problème.

De plus, tout nous porte à croire que le bromure de méthyle, utilisé en tant que désinfectant par fimugation des champs de tabac et de coton, peut dégager des composés du brome jusque dans la stratosphère où ils détruisent l'ozone par réaction.

Bref, l'équilibre de la vie dépend peut-être de la couche d'ozone dans la stratosphère. La diminution de la quantité d'ozone peut provoquer des modifications génétiques, entraîner une fréquence accrue de mélanomes, et avoir des effets appréciables sur les conditions climatiques dans le monde. L'état des recherches ne nous permet pas encore d'établir l'ampleur du problème, mais nous possédons déjà assez d'indices pour motiver une extrême prudence au sujet de l'utilisation de toute substance ou procédé risquant d'altérer la stratosphère.

6. Énergie nucléaire

Le groupe d'étude a présenté au Conseil le plan suivant pour l'étude proposée de l'état des connaissances sur les dangers écologiques des centrales nucléaires:

- 1. Le risque en tant que partie intégrante de la vie
- 2. Traits caractéristiques du système CANDU
- 3. Organismes de réglementation
- (a) Rôle de la Commission de contrôle de l'énergie atomique (b) Rôle du Comité international de protection
- . Effets biologiques de la radiation

sphère et les dangers que peuvent constituer pour elles les activités de l'homme, et faisant état des recherches qui sont actuellement en cours au Canada et à l'extérieur, et a été présenté au Conseil pour fins d'étude. La majeure partie des recherches canadiennes ont été effectuées par le Service de l'environnement atmosphérique, lequel se tient au courant des travaux effectuées à l'étranger à ce sujet et a présenté un exposé au ministre. Un rapport plus approfondi, qui devrait être présenté au Conseil sous peu par un groupe de travail interministériel fédéral, permettra de préparer les recommandavail interministériel l'étude du ministre.

En gros, c'est ozone (0₅) que contient la stratosphère qui est menacé. Dans des conditions normales, la formation de 0₅ équilibre à peu près sa destruction. La diminution de la quantité d'ozone permet une pénétration accue des rayons ultraviolets. Les risques de cancer de la peau et de mutations causées par des changements génétiques augmentent à la longue non seulement pour l'homme mais pour l'écosystème entier.

Les variations selon la latitude et les variations diurnes causées par les mouvements rapides des couches supérieures de l'atmosphère sont suffisamment grandes pour que, en comparaison, les modifications causées par l'homme ne soient pas encore significatives. Toutefois, l'extrapolation des tendances actuelles nous permet de dire qu'à moins que des forces nouvelles produisent un équilibre semblable à celui que nous connaissons actuellement, la teneur en ozone de la stratosphère diminuera de façon appréciable au cours des quelques prochaines décennies.

Les modifications dues à l'homme sont attribuables à plusieurs tendances. La première menace qui a été observée est celle des aéronefs en haute altitude dont les dégagements de protoxide d'azote entrent dans la stratosphère et contribuent à la décomposition de l'ozone. Puisqu'il n'existe pas de flottes nombreuses d'aéronefs supersoniques, la proportion de modification causée par l'activité des aéronefs est assez faible. Cependant, une source plus importante de protoxide d'azote est l'application de plus en plus répandue d'engrais azotés pour des fins agricoles, particulièrement sur des sols acides. Des sols deviennent acides par l'effet de pluies contenant des dégagements de SO₂ de source industrielle. Les effets des engrais azotés peuvent être amortis par l'usage approprié de des engrais azotés peuvent être amortis par l'usage approprié de chaux.

Le chlore libéré par la décomposition de certains chlorofluoroalcanes (fréons) causée par les radiation ultraviolettes dans la stratosphère est également un ennemi de l'ozone. L'emploi de ces gaz inertes soit

longue haleine que des gouvernements élus, surtout s'il y a divergence d'intérêts entre les paliers de gouvernement pour ce qui est des avantages à court terme. Le Conseil prévoit transmettre un rapport complet au ministre d'ici la fin de 1976.

4. Élaboration des politiques environnementales

Un rapport provisoire sur l'élaboration des politiques environnementales au Canada a été préparé à l'intention du Conseil qui l'a accepté à titre de base à l'étude plus approfondie de la question. Le rapport souligne qu'au Canada, non seulement l'élaboration de politiques publiques doit établir les principales lignes directrices pour l'avenir visant à la réalisation de ce qui est dans l'intérêt public par les meilleurs moyens possibles, mais ces politiques doivent être conformes aux désirs de la population sous réserve des directives stipulées dans l'Acte de l'Amérique du Nord britannique, directives stipulées dans l'Acte de l'Amérique du Nord britannique, et en matière d'environnement, doit s'appuyer sur les données scientifiques les mieux fondées.

Le ministère de l'Environnement du Canada est censé être l'instrument décisionnel par excellence en matière d'environnement au pays. Cependant, le rapport indique les difficultés inhérentes à son organisation en tant que ministère comportant des cadres et des employés à différents niveaux de responsabilité. Il n'en demeure pas moins que l'évolution technique rapide, l'expansion urbaine désordonnée, ainsi que la détérioration dans l'Arctique et les eaux côtières, contribuent à la nécessité primordiale de politiques environnementales conséquentes.

Il se fait sentir un besoin urgent de formulation par le ministère de l'Environnement d'une politique à long terme destinée à permettre de résoudre les problèmes critiques trop fréquents auxquels on ne peut apporter que des solutions de fortune. Les critères employés par le passé pour définir les objectifs des cadres d'organisation et pour prescrire des mesures ne sont pas assez souples et sont devenus insuffisants. Des moyens de mieux prévoir les changements de l'environnement et leurs conséquences s'imposent.

5. Changements provoqués dans la stratosphère

Un rapport préliminaire sur cette question, constituant une synthèse des connaissances actuelles sur les couches supérieures de la strato-

responsabilités de gestion des eaux des estuaires entre les gouvernements fédéral et provinciaux et les administrations municipales est défavorable au bien-être de tous.

Pursqu'il existe des centaines d'estuaires au Canada, il a été décidé d'en aborder l'étude en faisant le point sur la situation dans environ une douzaine d'estuaires types. La sélection de ceux-là s'est avérée difficile car les facteurs déterminants sont extrêmement variés et nous ne possédons des données antérieures sur ces facteurs que dans quelques cas. De fait, l'absence de connaisces facteurs que dans quelques cas. De fait, l'absence de connaisces rarbances sur les conditions physiques et biologiques de la plupart de ces régions constitue, à elle seule, une bonne raison de proposer l'étude intensive d'au moins les estuaires les plus touchés par les activités de l'homme.

Les paramètres comprennent le degré d'alluvionnement, la salinité de l'eau et ses variations saisonnières, la concentration et le genre de sédiments, l'effet des marées, l'effet des vents et des courants, les utilisations actuelles, les conséquences chimiques de l'entrée de l'eau douce, la profondeur, la superficie où s'exerce l'influence de l'estuaire, les espèces de poisson profitant de l'abri des petites baies, la vie des mollusques et des crustacés, l'abri des petites baies, la vie des mollusques et des crustacés, ainsi que l'occupation par la faune aquatique. Ces facteurs sont bien loin d'entrer en ligne de compte dans l'usage actuel, et l'usage prévu, de la zone côtière et des régions alluviales par l'homme.

Par suite de la présentation du rapport préliminaire, on a demandé que les travaux se poursuivent. Ces travaux consistent actuellement à rassembler les données déjà obtenues sur les aspects physiques, chimiques, géologiques, sociaux et politiques d'un certain nombre d'estuaires plus ou moins typiques choisis en raison de leur situation géographique ou du fait que la plupart des données dans situation géographique ou du fait que la plupart des données dans significative sur la plupart des estuaires canadiens est insuffisante, significative sur la plupart des estuaires canadiens est insuffisante.

Une des recommandations que nous avons faites dans le rapport prégestion et découle des lacunes évidentes de planification et de gestion efficace dans ces régions, qu'elles soient attribuables à la division des juridictions ou au fait qu'on ne reconnaisse pas l'importance des estuaires pour le bien-être national. Il a été proposé d'en confier la gestion à des commissions des estuaires ou à des sociétés d'Etat habilitées à planifier l'utilisation et l'aménagement futurs de manière à en tirer le maximum d'avantages l'aménagement futurs de manière à en tirer le maximum d'avantages l'aménagement futurs de manière à en tirer le maximum d'avantages l'aménagement futurs de manière à en tirer le maximum d'avantages ou organismes de ce genre peuvent mieux assurer la gestion de Des organismes de ce genre peuvent mieux assurer la gestion de

restrictions énergétiques sont introduites. Comme pour le gel des salaires et des prix, il sera impossible d'atteindre l'équité obsolue; on pourra au moirs éviter l'adversité grave.

En bref, le rapport souligne que la conservation de l'énergie est nécessaire et qu'elle aura des conséquences appréciables pour le caractère de notre économie et de notre société futures. On ne connaît ni le degré de rareté des ressources, ni la réaction du public aux conséquences éventuelles.

Il se fait sentir un besoin urgent de sélection des instruments de politiques et des moyens administratifs les plus aptes à amortir les effets défavorables de telles réductions de la consommation d'énergie. Il faut retenir les questions suivantes: les impératifs d'exploitation des sources d'énergie, l'ordre de priorité des utilisations terminales de l'énergie, la mise au point de méthodes de rationnement équitables, le cas échéant, et la définition des rôles des secteurs public et privé pour ce qui est de l'approvisionnement en énergie. Le public doit être informé des faits et sionnement en énergie, la faire cadrer les moyens disponibles avec conditionné de manière à faire cadrer les moyens disponibles avec les fins personnelles.

Le Canada a certes plus de possibilités de s'en sortir que la plupart des autres pays, l'exception faite des principaux pays producteurs de pétrole, mais il ne faut pas pour autant faire fin des résultats éventuels de l'augmentation soutenue au rythme actuel de la demande d'énergie.

3. Estuaires

Le groupe de travail sur les estuaires a été chargé d'étudier le rôle important des estuaires et d'autres régions de la zone côtière pour la vie économique et sociale du Canada. Le rapport du groupe fait ressortir leur vulnérabilité, les problèmes de juridiction qui se posent à leur sujet, et les méthodes appliquer pour en arriver à une gestion satisfaisante.

On a reconnu qu'il est nécessaire, dans bien des cas, de modifier l'utilisation des estuaires. Il se peut que les installations portuaires soient incompatibles avec les activités récréatives, que le déversement des eaux usées soit néfaste pour la pêche aux mollusques et aux crustacés, que les effluents empêchent nombre d'espèces de poissons de se reproduire dans les estuaires et même d'espèces de poissons de se reproduire dans les estuaires et même annule toute productivité biologique. En outre, le partage des annule toute productivité biologique.

Si nous projettions les tendances actuelles de consommation d'énergie au Canada jusqu'à l'an 2,000, nous verrions quadrupler la demande. Il semble certain que la disponibilité restreinte des sources d'énergie empêchera cette croissance. Il importe donc de réduire la consommation d'énergie, en minimisant les bouleversements de la société et les déboursés.

Les conditions pénibles et même une réduction de la qualité de la vie en raison des mesures de conservation d'énergie dépendront de la mesure dans laquelle les excès actuels peuvent être éliminés sans heurts, de l'importance des changements techniques nécessaires pour éviter les pénuries, et de l'attitude individuelle à l'égard des conséquences de la conservation. Les modes de consommation changeront sans doute et le nouveau régime pèsera probablement moins sur les écosystèmes.

Parmi les effets environnementaux favorables qui pourraient s'ensuivre, mentionnons le ralentissement de l'exploitation des ressources en hydrocarbures de l'Arctique, la diminution de la constructions routière (mais probablement un regain des chemins de fer), le freinage de l'expansion des aéroports, la réduction des niveaux de pollution, et la concentration plus faible dans les villes, voire la modification des emplacements industriels et résidentiels afin d'éviter les embouteillages.

L'emploi de la main-d'oeuvre dans l'industrie augmentera au profit de l'actif; il est donc probable qu'il y ait moins de biens et services à consommation d'énergie égale causant ainsi une baisse du revenu réel. On peut probablement prévoir une baisse des investissements jumelée à une augmentation de l'élément de la main-active affectée aux services. Les tendances inflationnistes prendront probablement le dessus à court terme parce que chacun tentera de maintenir ses habitudes de consommation antérieures, tentera de maintenir ses habitudes de consommation antérieures, mais il est probable qu'à plus longue échéance la tendance deviendra anti-inflationniste.

On peut s'attendre à ce que l'accent sur les services sociaux diminue beaucoup, mais aussi à ce que nous devions utiliser plus de personnes en marge de la population active. Il est inévitable que les relations tions fédérales-provinciales changeront. D'autre part, les relations de travail seront tendues dans l'immédiat, mais cette tension devra de travail seront tendues dans l'immédiat, mais cette tension devra faire place à une plus grande autonomie individuelle.

Même si nous pouvons prévoir ces changements, leur importance demeure imprévisible. Il en ira de beaucoup des moyens par lesquels les

employer plus judicieusement nos ressources, au moins jusqu'à ce que des sources d'énergie renouvelables puissent suffir à nos besoins.

Le rapport traite tant des aspects matériels que sociaux de la conservation de l'énergie, car une consommation d'énergie réduite influera sur l'environnement canadien et sur le bien-être économique et social des Canadiens à cause:

a) des effets directs sur l'environnement d'un rythme ralenti de production et de consommation d'énergie, et

b) des changements économiques et sociaux accompagnant la conversion à des techniques qui nécessitent moins d'énergie, ainsi que de la production et de la consommation de biens et services d'un genre différent qui s'impose.

Le rapport analyse les principes de conservation de l'énergie, les effets écologiques directs de la consommation et du transport, la gamme des conséquences sociales éventuelles, et divers moyens de réduire la consommation d'énergie. Il évalue les politiques et les démarches actuelles et recommande certaines mesures.

de revient courant par le passé. nécessiteront des déboursés qui n'étaient pas justifiables aux prix des conversions à des modes plus efficaces de consommation d'énergie cherche a été effectuée sur les méthodes d'emmagasinage. La plupart moyens plus efficaces d'emmagasiner l'énergie. Bien peu de reet les marées seraient peut-être plus viables si nous avions des d'énergie renouvelables telles que le vents, les pompes thermiques moyens de ménager nos ressources en hydrocarbures. Les sources thermique résiduelle des stations génératrices seraient d'autres déchets urbains en tant que combustibles et de recyclage de l'énergie pourrait réduire la consommation d'au moins 10%. L'emploi des publics. La conception d'usines en fonction de l'économie d'énergie d'énergie, mais on la préfère au rail et aux moyens de transport moyen de transport le moins efficace en fonction de la consommation qu'à 4 % l'énergie disponible. L'automobile est de beaucoup le pétrole, et que la plupart des appareils électriques ne consomment ne profite que d'environ 30% de l'énergie qu'il pourrait retirer du de notre utilisation de ces sources, à savoir que le consommateur ses produits secondiares. La deuxième, est l'inefficacité extrême l'énergie, que ce soit les sources de pêtrole ou d'urantum et de l'épuisement des matières emmagasinées servant à produire de Du point de vue technique, la première limite qui se pose est

- 4. Relations publiques: L'encouragement et l'appui de l'examen par le public du cours de la construction par l'entremise d'un organisme public indépendant.
- 5. Parcours: tous les efforts d'établissement du parcours du gazoduc d'Alaska au sud du fleuve Yukon.
- Protection de la faune: l'incitation à désigner une réserve de la faune s'étendant sur une largeur de deux milles de chaque côté du parcours.

Le Conseil a donné suite à ces recommandations en adressant plusieurs questions au Service de la protection de l'environnement en vue: de la mise au clair du plan du travail au chapitre de la responsabilité quant aux codes et aux lignes directrices; de l'élaboration de méthodes de vérification de la suffisance des restrictions nécessaires; de la mise au point de modes d'application des normes de construction et d'exploitation; et de la prévision de la formation et de l'habilitation des inspecteurs, ainsi que des manoeuvres et des contremaîtres travaillant sur le terrain. Le Conseil a suggéré que cette formation s'étende aux instructeurs.

Les recommandations sur les restrictions applicables à la construction routière ont été semblables, mais moins détaillées, que celles sur la construction du gazoduc, puisque l'approbation imminente de celle-ci lui accordait un plus grand degré immédiat de priorité. Même si le Conseil a manifesté une certaine réserve au sujet des dangers écologiques et des problèmes sociaux inhérents à la concentration de pipelines et de routes en un corridor, il a jugé avoir exprimé ces préoccupations aussi fortement que le lui permettait son mandat.

2. Conservation de l'énergie

Le groupe de travail chargé d'étudier ce sujet a préparé un rapport préliminaire qui, après avoir été examiné et approuvé par le Conseil, a été transmis au ministre à titre de guide d'évaluation des re-commandations que présentera un groupe de travail interministériel.

Le rapport souligne que bon nombre des problèmes environnementaux actuels les plus urgents sont le résultat de l'utilisation indue de l'énergie dont les sources actuelles sont en majeure partie non renouvelables en termes de l'existence humaine. Que nous le voulions ou non, le tarissement de ces sources d'énergie nous obligera à ou non, le tarissement de ces sources d'énergie nous obligera à

- c) Les questions demeurant sans réponse et, plus important, les questions qu'il importe de poser; et
- d) Les compromis éventuels en vue de l'obtention de résultats les plus satisfaisants.

Des résumés sur les problèmes en question, certains comprenant des recommandations de mesures, figurent dans la présente partie du Revue annuelle afin de témoigner de certains aspects des travaux du Conseil consultatif canadien de l'Environnement et de sensiviliser le public canadien, le ministère de l'Environnement et d'autres organismes responsables à quelques questions exigeant une attention particulière.

1. Construction et exploitation de routes et de pipelines dans le Nord

Vu l'urgence évidente de ce sujet, un ensemble passablement complet de recommandations portant examen des problèmes connexes a été présenté. Les problèmes sont attribuables, en majeure partie, au rythme lent du renouvellement naturel, et de la biodégradation des déchets, dans les biosystèmes du Grand nord et de l'Arctique. Ils ont trait à l'érosion des sols, à l'élimination des déchets, aux organismes fluviatiles, à la faune, à la pollution de l'air, à l'esthétique du milieu, aux effets de l'augmentation des activités l'esthétique du milieu, aux effets de l'augmentation des activités l'esthétique du milieu, aux effets de l'augmentation des activités mandations précises visant à assurer la protection de l'environnement aux défavorables. Les recommandations précises visant à assurer la protection de l'environnement comprennent:

- 1. Ordonnancement: la préparation et l'approbation, avant le début de tout travail de construction, d'un code environnemental de l'aménagement de pipelines dans le Nord.
- 2. Contrôle: l'institution par le gouvernement fédéral d'un organisme unique chargé d'assurer la surveillance de tous les aspects de la construction, y compris les travaux préliminaires.
- Jes ministères de l'Environnement et des Affaires indiennes et du Nord canadien afin de contrôler et d'évaluer la construction et l'exploitation du pipeline, de concert avec les administrations des territoires, dans une perspective environnementale.

- et particulièrement de la vallée du Mackenzie. construction et de l'exploitation des routes et pipelines du Nord, 1. Les aspects environnementaux de la conception, de la
- sur une grande échelle des sables bitumineux de l'Athabasca. 2. L'étude des aspects environnementaux de l'exploitation
- l'énergie. électrique de la baie James, y compris de la transmission de 3. Les aspects environnementaux de l'aménagement hydro-
- 4. Les estuaires importance, utilisation et politiques.
- l'energie nucléaire au Canada. 5. Les aspects environnementaux de l'exploitation de
- milieus urbains et ruraux. 6. La planification de l'utilisation des terres dans les
- 7. La politique de l'utilisation des terres à l'état
- sauvage.
- La culture et l'emploi des algues au Canada.
- seraient appropriées devant ces changements. l'homme dans la stratosphère, et une étude des politiques qui 9. Les effets sur le Canada des changements provoqués par
- de conservation de l'énergie et de réduction de la demande. 10. Les aspects environnementaux des possibilités canadiennes
- mentales. 11. Ce à quoi tient l'établissement de politiques environne-
- études préliminaires visant à déterminer: sur tous les programmes (sauf ceux de la culture des algues) des dispose le Conseil. Aussi, il a été proposé que soient effectuées de ces questions, en raison du temps et des fonds limités dont On a reconnu qu'il n'est possible de résoudre intégralement aucune
- qebroker: a) L'étendue du problème et l'effort de résolution à
- mesure d'entreprendre des travaux décisifs; p) res organismes ou le personnel qui sont le plus en

PARTIE B: IMPORTANTS PROBLÈMES ENVIRONNEMENTAUX CANADIENS

J.P. Mowlan

Introduction

Le Conseil consultatif canadien de l'environnement a choisi parmi ses membres, en novembre 1974, un groupe de travail qu'il a chargé de formuler les problèmés et les impératifs environnementaux dans les limites de son mandat et de ses restrictions budgétaires. Une liste de recommandations a été préparée conformément aux instructions suivantes du Conseil;

Etudier les suggestions déjà faites, par les membres et d'autres personnes, de sujets de recherches ou d'études éventuelles; évaluer de leur pértinence, leur faisabilité et le cout de leur réalisation; établir l'ordre de priorité; et recommander un programme approprié au Conseil pour l'année civile 1975.

Le groupe de travail a dégagé trois catégories de sujets de recherche:

- a) des études entreprises pour donner suite à une demande du ministre ou à l'avênement d'une urgence;
- b) des études écologiques d'intérêt particulier pour le Canada, et
- c) des études écologiques d'intérêt mondial ou général.

Ces sujets recouvrent des domaines divers tels que l'énergie, les transports, les rapports urbains-ruraux, les terres inexploitées, l'utilisation des ressources, les principes applicable aux problèmes environnementaux, l'information publique, l'établissement de politiques, et les conflits de juridiction. Certains de ceux-là dépassent évidemment les possibilités d'action du Conseil; d'autres sont si complexes que le Conseil se limiterait à formuler les sont si complexes que le Conseil se limiterait à formuler les questions auxquelles il faudra répondre; mais dans certains cas, il estime pouvoir prendre des mesures efficaces au cours de 1975.

Le groupe de travail a finalement choisi onze sujets d'étude préliminaire destinés à être proposés au Conseil en tant qu'objectifs annuels:

pressions actuelles et prévues pour l'aménagement. Les recommandations issues de cette réunion comprenaient le besoin urgent de déterminer et de délimiter les zones du delta-estuaire qui sont d'une importance environnementale critique, l'investigation des conséquences écologiques de l'aménagement, l'institution d'un groupe intergouvernemental chargé d'effectuer les études nécessaires, ainsi que l'exécution des étapes d'évaluation des incidences environnementales pour les cas d'aménagement qui influent sur les ressources de l'estuaire.

Centre canadien des eaux intérieures

Le Conseil s'est réuni au Centre canadien des eaux intérieures, à Burlington (Ontario), en novembre 1975 et, à cette occasion, le personnel du Centre a exposé aux membres du Conseil leurs programmes et activités. On a profité de l'occasion pour inviter les spéciatistes provinciaux et industriels à discuter des problèmes ayant trait à l'environnement urbain. Le Conseil a été sensibilisé au souci que cause le manque de programmes universitaires en génie de l'environnement, la lutte contre la pollution atmosphérique dans le l'environnement, la lutte contre la pollution atmosphérique dans le sud de l'Ontario, et le problème de juridiction touchant la contamination par le mercure des lacs dans le Nord-Ouest de l'Ontario.

5. Initiatives futures

Le Conseil continuera d'étudier les aspects environnementaux notamment des sujets suivants: l'élaboration de politiques et la participation du public; l'offre et la demande d'énergie; la prolifération de centrales nucléaires; les terres sauvages; la recherche et l'exploitation des ressources dans le Nord; les estuaires; les agglomérations urbaines; et les incidences transfrontalières de l'aménagement nouveau au Canada et aux Etats-Unis.

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phie, la géologie et le climat canadiens. ainsi que les problèmes écologiques spéciaux que posent la géograproblème des substances toxiques, la production d'énergie nucléaire, l'environnement s'est vue encouragé à étudier attentivement le la conservation de l'énergie. Le Conseil consultatif canadien de quences socio-économiques d'une expansion économique soutenue, et assemblée: les méthodes d'évaluation environnementale, les consé-On a retenu trois sujets en vue des délibérations de la prochaine et la répartition démographique en tant que problème environnemental. l'environnement urbain; les indices de qualité de l'environnement; les organismes consultatifs; la sensibilisation au sujet de cipation du public au processus décisionnel; la communication entre planification et la gestion de l'utilisation des terres; la partil'autre, sept sujets d'intérêt particulier ont été discutés: la que le processus de consultation varie beaucoup d'une province à organismes participants, au cours desquelles il est apparu évident

Delta-estuaire du fleuve Fraser

et prendre des décisions judicieuses, surtout en raison des santes pour que nous puissions assurer une planification appropriée Conseil a conclu que nos connaissances fondamentales sont insuffirait la pollution par le bruit dans les secteurs résidentiels. Le tés de subsistance de la vie marine dans ce dernier et augmentel'extension d'une piste dans l'estuaire modifierait les possibilirégime de sédimentation. L'expansion de l'aéroport comportant ment pour fins de protection contre les inondations modifie le urbaine empiète sur les riches terres arables du delta. L'indiguel'eau, mettant en danger les stocks de poissons. L'expansion et de la faune, tandis que les effluents diminuent la qualité de industrielles et le transport y réduisent les habitats des poissons que dans le delta et l'estuaire du fleuve Fraser. Les activités région du Canada où tant de conflits sur le plan de l'utilisation pour la première fois. Il n'existe probablement aucune autre confrontation de points de vue variés qui, apparemment, avait lieu d'autres organismes. La réunion a donc servi de colloque par la nombre n'étaient pas au courant des recherches effectuées par utiles non seulement au Conseil mais aux participants dont bon ment, et du Conseil des ports de Vancouver. Ces exposés ont été eaux usées, du Greater Vancouver Regional District Planning Departsion des ports du Fleuve Fraser, du centre de recherche sur les plusieurs divisions du ministère de l'Environnement, de la commis-Conseil a organisé la présentation d'exposés par des membres de A l'occasion d'une assemblée tenue à Vancouver en janvier 1975 le

Financement de groupes de citoyens

Le Conseil a étudié la question de l'aide financière aux organismes bénévoles s'occupant de la qualité de l'environnement, et a recommandé que les groupes auxquels on pourra accorder de l'aide soient en grande partie bénévoles et indépendants, qu'ils manifes-tent des préoccupations au delà de l'échelle locale, ainsi que l'aptitude à employer judicieusement leurs fonds. Les membres du l'aptitude à employer judicieusement leurs fonds. Les membres du Conseil ont appuyé à l'unanimité le principe de l'aide fédérale.

Processus d'evaluation et de révision environnementales

Le Conseil a examiné de façon soutenue les activités et l'efficacité du Processus d'évaluation et de révision environnementales (PERE) et a transmis un mémoire détaillé visant à conseiller le ministre. Ce mémoire recommandait des modifications telles que l'augmentation des pouvoirs et de l'indépendence du président du PERE, l'inclusion plus globale des projets dont les incidences éventuelles sont appréciables, et l'expansion du rôle du public au cours du processus de révision.

Forage hauterier dans la mer de Beaufort

Le Conseil a continué de se montrer soucieux du fait que la recherche avait été insuffisante pour permettre de bien évaluer les risques que comportait l'autorisation d'un programme de forage hauturier en 1976. Les membres du Conseil se sont tenus au courant de l'avancement des travaux, mais ne se sentaient pas suffisamment informés pour présenter des recommandations particulières.

Réunion mixte des conseils de l'environnement

Afin de bien établir les problèmes d'intérêt commun et de déterminer les moyens de minimiser le dédoublement des efforts, une assemblée de représentants des conseils provinciaux chargés d'assurer des services de consultation sur l'environnement s'est entretenue avec les membres du Conseil consultatif canadien de l'environnement, à Ottawa, en février 1975. Toutes les provinces sauf Terre-Neuve y étaient représentées. Par suite des présentations faites par les étaient représentées.

Préparer un survol des succès et des échecs des activités environnementales du Canada, des leçons à en tirer et des sujets d'intérêt pour l'avenir, destiné à paraître dans un rapport annel.

4. Activités du Conseil

ministère des Affaires indiennes et du Nord). contrôle environnemental de la route Mackenzie (M. J. Riddell, Grande-Bretagne (M. E. Goldsmith, rédacteur, The Ecologist; et le tion of Canada); les pratiques de gestion de l'environnement en lères de l'Ouest du Canada (M. G.T. Page, directeur, Coal Associaenvironnementales de l'exploitation accrue des ressources houil-Alberta Environment Conservation Authority); les incidences des sables bitumineux de l'Athabasca (M. W.R. Trost, président, Mary Collins, Pallister Resources Management Ltd); l'exploitation et M. K. Vincent, du Canadian Arctic Resources Committee, et participation du public relatifs à cette activité (MM, D.H. Pimlott forage dans l'Arctique canadien ainsi que les programmes et la Ces exposés ont porté notamment sur: les dangers que comporte le des domaines importants ou le point de vue de groupes de citoyens. assisté à ses réunions et y ont exposé les faits nouveaux dans A la demande du Conseil, un certain nombre de spécialistes ont

Des autorités du ministère de l'Environnement ont donné des exposés au Conseil sur divers sujets dont les mesures prises en vertu du Processus d'évaluation et de révision environnementales (MM. R.R. Logie et V.V. Spence), la participation du ministère au projet d'énergie électrique de la baie James (M. B.D. Cook et Kathy Arkay), une proposition d'aider les groupes de citoyens à partir des fonds publics (M. B. Bélovic), les difficultés de financement qu'éprouvent les groupes de recherche multidisciplinaires (MM. M.C.B. Hotz vent les groupes de recherche multidisciplinaires (et H.F. Fletcher), ainsi que le rôle du Centre de spéculation sur les perspectives d'avenir (M. R.W. burie).

MM. P. Dansereau et F.K. Hare ont donné des conférences illustrées sur des aspects environnementaux de la Nouvelle-Zélande et de l'Australie, respectivement, et M. J.K. Fraser en a fait autant sur une reconnaissance effectuée à la demande du Conseil le long de la route Mackenzie.

3. Rôle du Conseil

traite. plus clairement des rapports et des problèmes variables dont il Le Conseil a reconsidéré son rôle et a formulé un énoncé témoignant

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PARTIE A: ACTIVITÉS 1975

lan McTaggart-Cowan

1. Réunions du Conseil

Au cours de la période visée par le présent rapport, soit de juillet 1974 à décembre 1975, le Conseil a tenu 14 réunions. Le Comité exécutif en a tenu 11, et le sous-comité des priorités, deux. Toutes les réunions plénières du Conseil ont eu lieu à Ottawa, sauf deux, dont une s'est tenue à Vancouver et l'autre à Burlington. Dans la plupart des cas, les assemblées ont duré deux journées entières.

2. Membres

M. Joseph B. MacInnis a démissionné en 1974. Le ministre a nommé au Conseil MM. F. Kenneth Hare et Eric Gourdeau, en novembre 1974, et MM. Irving K. Fox et Ross H. Hall, en mai 1975, portant ainsi 1'effectif au nombre prévu de seize. Mr. Robert G. Rogers est devenu membre en janvier 1975 par sa nomination à la présidence du Conseil consultatif des forêts.

Les mandats du président, M. Arthur Porter, et du vice-président, M. Pierre Dansereau, ont pris fin, et le ministre a confié un mandat de trois ans à ces postes à MM. Ian McTaggart-Cowan et Philippe Garigue.

Une annexe constitue une liste des membres et de leurs affiliations. Par le concours de ces membres, le Conseil continue de traduire les connaissances particulières et les intérêts régionaux nécessaires pour donner des conseils appropriés sur la vaste gamme des problèmes environnementaux.

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- 3. Le ministère de l'Environnement doit fournir un secrétaire.
- 4. En plus de présider les réunions, le président doit être chargé d'élaborer et de diriger le travail du conseil.
- 5. Le conseil doit se réunir au moins deux fois par année à des dates préétablies et à d'autres moments, au besoin sur convocation du président.
- 6. Sous réserve de la disponibilité de fonds, le conseil doit avoir le pouvoir de créer des comités ou des groupes de travail composés de ses membres ou d'autres personnes afin de faire des études et des rapports sur les domaines d'intérêt particulier.
- 7. Le ministère de l'Environnement doit fournir un budget qui couvre les frais opérationnels du conseil. Le budget doit prévoir le paiement des frais de déplacement et de subsistance cement et de subsistance ordinaires, ainsi qu'une indemnité de \$75 par jour.

- pétences fédérale, provinciales, compte tenu des diverses comlité de l'environnement; conserver ou rehausser la quaministère visant à restaurer, l'efficacité des activités du concert avec les provinces; d) fèdèral agissant seul ou de tions par le gouvernement ce dui concerne les intervenl'objet; c) les priorités en et des menaces dont il fait b) l'état de l'environnement être renvoyées par le ministre; toutes questions pouvant lui de l'Environnement sur: a) objet de conseiller le ministre dien de l'environnement a pour 1. Le Conseil consultatif cana-
- 2. Le président et les autres membres du conseil doivent être nommés par le ministre pour une durée ne dépassant normalement pas trois ans; ils peuvent être nommés à plus d'une reprise et doivent représenter les présidents des conseils de ressources chargés de conseiller le ministre, et les membres ministre, et les membres extraordinaires.

née des ressources du pays.

l'expansion économique ordon-

et de la nécessité d'assurer

territoriales et municipales,

PUBLICATIONS

Revue annuelle 1973-1974, Partie A: Activités 1973-1974, Arthur Porter. Partie B: Problèmes et priorités dans l'environnement canadien, Pierre Dansereau.

Mécanisme des évaluations environnementales pour le Canada. Rapport No 1, Février 1974.

L'éthique de l'environnement - son élaboration et ses implications. Rapport No 2, Janvier 1975. Norman H. Morse. Préface, Pierre Dansereau. Avant-propos, Donald A. Chant.

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CONSEIL CONSULTATIF CANADIEN DE L'ENVIRONNEMENT

Le Conseil consultatif canadien de l'environnement a été créé en 1972 par décision du Cabinet fédéral, pour conseiller le ministre de l'Environnement sur:

- les questions que le ministre pourrait lui poser;
- l'état de l'environnement et ce qui le menace;
- les initiatives à reconnaître comme prioritaires par le gouvernement fédéral conjointement avec les provinces;
- l'efficacité des interventions du ministère de l'Environnement dans le restauration, la préservation ou l'amélioration de la qualité de l'environnement.

Le conseil se compose d'au plus 16 membres. Il comprend les présidents des conseils sur les ressources, qui conseillent le ministre, et des membres choisis à titre personnel, qui représentent les divers aspects de la vie canadienne et viennent de toutes les régions du pays. Aucun agent du ministère de l'Environnement n'est membre du conseil; cependant, le ministère fournit un secrétariat permanent.

Pour remplir son mandat, le conseil entreprend des études et des rétrospectives sur des questions ayant une portée sur l'environnement et sur la politique à suivre; il tient des réunions régulières pour étudier le progrès et le développement de ces fonctions; il prépare des commentaires, des déclarations et des rapports, au besoin. Le conseil publie une revue annuelle qui comprend un sommaire de l'état de l'environnement au Canada, et de temps en temps des rapports sur d'autres sujets d'importance et d'intérêt général.

Les demandes de renseignements au sujet des travaux du conseil doivent être adressées au

Secrétariat Conseil consultatif canadien de l'environnement a/s Ministère de l'Environnement Ottawa (Ontario)

Advisory Council

de l'environnement Conseil consultatif canadien Canadian Environmental



1e 31 décembre 1975

Ottawa (Ontario) Le ministre de l'Environnement

Monsieur le ministre,

annuelle du Conseil pour l'année 1975. C'est avec plaisir que vous nous remettons la Revue

réalisations du Conseil. état de ces grands points d'intérêt de même que des de la qualité de l'environnement. Ce rapport fait donc Canadiens que pour les personnes responsables du maintien étudié bon nombre de questions importantes tant pour les juillet 1974 à décembre 1975, durant laquelle nous avons notre fondation, et elle couvre la période allant de Cette revue constitue le deuxième rapport officiel depuis

et avisée, de nos ressources naturelles. questions de l'utilisation actuelle et future, mauvaise Nous espérons aussi sensibiliser le public à la entreprendre pour élaborer des politiques appropriées. doivent faire face, et sur les efforts qu'il doit problèmes environnementaux auxquels les Canadiens le rôle du ministère de l'Environnement vis-à-vis des Cette publication vient réaffirmer notre position sur

. səuguitsib Veuillez agréer, Monsieur, L'expression de nos sentiments

Vice-président Philippe Garigue

Président Lan McTaggart-Cowan

WEMBRES

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Vancouver (Colombie-Britannique)

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1975 Revue annuelle



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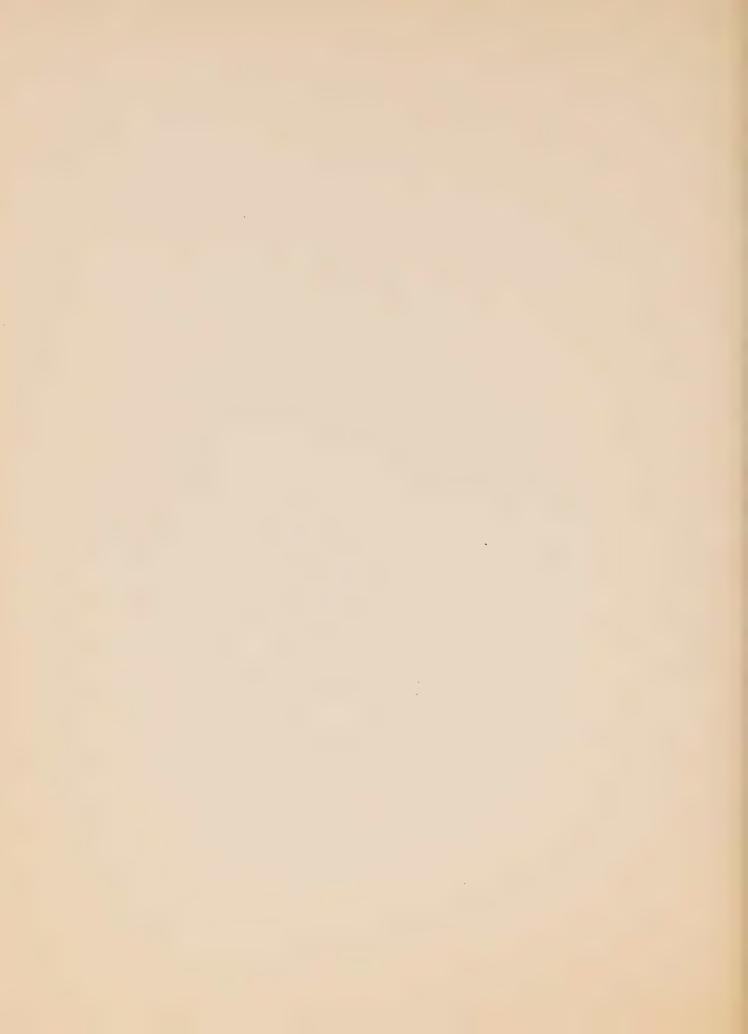
1975 Revue annuelle

Canadian Environmental Advisory Council

Annual Review 1976

STATE OF THE CANADIAN ENVIRONMENT

AIR QUALITY
URBAN ENCROACHMENT ON FARM LAND
ENDANGERED WILDLIFE
FRESH WATER QUALITY
NUCLEAR POWER AND THE ENVIRONMENT
ESTUARIES
ENVIRONMENTAL POLICY-MAKING



Canadian
Environmental
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Council

Annual Review 1976

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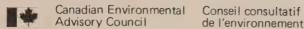
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Dr. J. Keith Fraser Associate Secretary

Miss Veena Singhal
Administrative Assistant

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December 31, 1976

The Minister Department of Fisheries and Environment Ottawa, Ontario

Dear Mr Minister

We are pleased to place in your hands the Annual Review of the Canadian Environmental Advisory Council for the year 1976.

This Annual Review is in two parts. As Part A, we have summarized the business of the Council as it relates to the meetings held, environmental topics discussed, advice generated and several other matters related to the Council as a part of the concern of the Government of Canada to maintain the wellbeing of Canadian environments.

As Part B of the report, we have assembled a number of concise. factual accounts of the state of different aspects of the Canadian environment as perceived in 1976. In preparing these studies, we have sought assistance from well-informed officials in the Department of Fisheries and Environment and in other federal departments and provincial agencies, from persons in the universities and colleges. from non-governmental organizations and from the business community. Wherever we have asked for assistance, we have received enthusiastic cooperation and we are most grateful to all who have helped us. We have drawn on our own experience in interpreting the information and in writing the reports, and we take responsibility for statements made.

We hope that the reviews which we have prepared will prove useful to the Canadian community generally as well as to yourself. Most of the studies have led to recommendations to you directing attention to needed new initiatives.

Yours sincerely,

Ian McTaggart-Cowan Chairman

Philippe Garigue Vice-Chairman

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council was established in 1972 by decision of the federal Cabinet, to advise the Minister of the Environment on:

- such matters as may specifically be referred to it by the Minister;
- the state of the environment and threats to it;
- the priorities for action by the federal government or by the federal government jointly with the provinces;
- the effectiveness of activities of the Department of the Environment in restoring, preserving or enhancing the quality of the environment.

The Council is composed of up to sixteen members. It includes the Chairmen of the resource councils advisory to the Minister, plus members at large who serve in an individual capacity and are drawn from a wide cross-section of Canadian life and from all across Canada. Officials of the Department of the Environment are not members of the Council; however the Department provides a continuing Secretariat.

To carry out its functions the Council undertakes studies and reviews of matters of environmental concern and policy, holds regular meetings to consider progress and developments with regard to these concerns, and prepares comments, statements and reports as appropriate. The Council publishes an *Annual Review* which includes a summary of the state of the environment in Canada, and from time to time reports on other matters of general interest and importance.

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary, Canadian Environmental Advisory Council, c/o Department of the Environment, Ottawa, Canada K1A OH3

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TERMS OF REFERENCE

- The purpose of the Canadian Environmental Advisory Council is to advise the Minister of the Environment: a) on such matters as may be specifically referred to it by the Minister; and on b) the state of the environment and of threats to it; c) priorities for action by the federal government jointly with the provinces; d) the effectiveness of departmental activities in restoring, preserving or enhancing the quality of the environment; bearing in mind the divided federal, provincial, territorial and municipal jurisdictions and the necessity for orderly economic development of the country's resources.
- 2. The Chairman and the other members of the Council shall be appointed by the Minister for terms not normally exceeding three years, may be re-appointed, and shall represent the Chairmen of resource councils advisory to the Minister, and members at large.

- 3. The Department of the Environment shall provide a secretary.
- 4. The Chairman, in addition to presiding at meetings, shall be responsible for developing and directing the work of the Council.
- 5. The Council shall meet not less than twice per annum at predetermined times, and at such additional times as may be required at the call of the Chairman.
- 6. Subject to the availability of funds, the Council shall be empowered to establish committees or working groups from among its members and others to study and report on fields of special interest to the Council.
- 7. The Department of the Environment shall provide a budget to cover the operational costs of the Council. The budget shall include provision for payment of ordinary transportation costs and living expenses plus per diem allowances of seventy five dollars.

PUBLICATIONS

Annual Review 1973-1974. Part A: Activities 1973-1974. By Arthur Porter. Part B: Problems and priorities in the Canadian environment. By Pierre Dansereau.

Annual Review 1975. Part A: Activities 1975. By Ian McTaggart-Cowan. Part B: Significant Canadian environmental problems. By J.P. Nowlan.

An environmental impact assessment process for Canada. Council Report No. 1. February 1974.

An environmental ethic - its formulation and implications. Council Report No. 2. January 1975. By Norman H. Morse. Preface by Pierre Dansereau. Foreword by Donald A. Chant.

Harmony and disorder in the Canadian environment. Occasional Paper No. 1, 1975. By Pierre Dansereau.

PART A: ACTIVITIES 1976

1. Meetings of the Council

Council held six full meetings in 1976, as well as six meetings of the executive committee and a special meeting to examine the 1977 program of studies. All plenary meetings took place in Ottawa except for one in April at the Atmospheric Environment Service establishment at Downsview, Ontario.

2. Membership

The terms of appointment of Dr. H.E. Duckworth, Mr. Guy Legault and Dr. J.P. Nowlan were completed in the spring of 1976. Dr. Nowlan was retained by Council as a consultant. Though Mr. D.F. Miller relinquished the chairmanship of the Fisheries Advisory Council early in the year, he was asked by the Minister to continue for the time being to act on Council to provide advice and expertise in the field of fisheries management.

3. Publications

An expansion of Dr. Pierre Dansereau's contribution to the *Annual Review 1973-74* was published in 1976. A popular version of the environmental ethic paper, and a report on the environmental aspects of nuclear power development were in progress or in the press at the end of 1976.

4. Activities of the Council

Council acted as a co-sponsor with the Advisory Committee on Stratospheric Pollution in organizing a meeting in Toronto in April to discuss the present state of knowledge of the ozone problem. Council helped to organize and participated in a seminar on future environmental issues held in February at the Institute for Environmental Studies at the University of Toronto, and made a grant to this Institute to bring together, in May,

Harmony and disorder in the Canadian environment, by Pierre Dansereau. Occasional Paper No. 1, Canadian Environmental Advisory Council, Ottawa, 1975, 145 pp.

specialists concerned with the functioning of the nitrogen cycle and the effect of man's activities in releasing nitrous oxides into the atmosphere.

Dr. David Bates, University of British Columbia, described the Science Council study Policies and Poisons at a Council meeting in April. Several officials of the Department of Fisheries and the Environment attended Council meetings to brief members on various topics: Dr. R.R. Logie and Mr. W. Tait, on the Environmental Assessment and Review Process; Mr. J.W. Maxwell, on Canadian land use policy; Mr. N. Tywoniuk, concerning an environmental code for northern pipelines; Mr. A. Malysheff, reporting on the United Nations HABITAT conference; Dr. H. Inhaber, on environmental indices; Mr. H. Saleh, on the ARK project in Prince Edward Island; Dr. P. Roberts-Pichette, on the Man and the Biosphere (MAB) proposals for an Atlas of Northern Canada; Mr. Paul Tellier, on environmental policy-making; and Mr. A.L.W. Tuomi, on recreational fishing.

Reports or memoranda of advice presented to the Minister included an examination of the socioeconomic implications of energy conservation; recommendations on an environmental code for pipelines; comments on amendments to the Environmental Assessment and Review Process; expressions of concern about developments regarding the Vancouver airport extension and the irresponsible shooting of sea lions on the Pacific coast; and a brief recommending support of voluntary associations.

5. Future activities

Following a review of significant problems and issues, and in the light of Council's role and limited resources, a study program for 1977 was developed. It was anticipated that the Department would seek Council's advice on the approaches taken in position papers on transportation, food, settlements and other aspects of environmental policy. Council agreed that the study of certain topics should be continued, including the mechanisms for environmental assessment; the effects of uncontrolled urbanization; regional developments in northern Canada; the role and support of public interest groups; policies regarding the management of wild lands; the review of the effectiveness of environmental policy-making; the implementation of environmental codes; and problems related to energy development and use. The main new topics to be taken up were the environmental implications of the utilization of marine resources; the effect and control of toxic substances; the funding of multidisciplinary research; the effectiveness of the dissemination of environmental information; and the development of a national land use policy.

PART B: THE STATE OF THE CANADIAN ENVIRONMENT-1976

INTRODUCTION Ian McTaggart-Cowan

The present-day concern for the environment in which we live arose from the realization that many of our industrial byproducts were returning by various insidious paths to induce the misery of sickness and indeed to shorten our lives. Some obvious kinds of industrial illness have long been recognized, but we are now equipped with sophisticated analytical procedures able to identify harmful products, and we have set up rigorous research protocols to establish the seriousness of their impacts upon human wellbeing.

Ecological research has exposed extensive webs of sequential interdependence of organisms related through food chains, whereby some compounds present in the environment in quantities too small to be of obvious concern become concentrated in passing from one level of organisms to higher levels until they attain dangerous concentrations. Some of the once popular insecticides are well known examples.

The task of pollution control may appear deceptively simple. On the contrary, the problem is one of bewildering complexity, and steadily becoming not clearer but more complicated and difficult, involving the painstaking identification of the vast assortment of compounds entering our environment, their influence on human health, their sources and pathways. Concomitant with this task is the development of responsible action to regulate and control these sources of contaminants to the point where they no longer reach dangerous levels.

Furthermore, our concepts of the desirable state of the human environment has expanded greatly. If the introduction of commercial fertilizers draining from agricultural lands or even of the sterilized products of sewage disposal alters the chemical content of lake water, the long term consequences can be detrimental to all living about and enjoying the presence of the lake, those dependent on it for drinking water, or for harvesting and using its fish populations. Such changes affect not only the wellbeing of local peoples and their enjoyment of the environment but directly influence the value of lakeshore land. Thus the actions of persons quite remote from the area of impact can directly influence the health, the enjoyment and the livelihood of others.

Problems of a similar nature are now the source of study, discussion, negotiation and litigation where the actions of people in one region

give rise to harmful impacts on those of another. This is of special concern where rivers flow across jurisdictional boundaries, or where prevailing winds carry atmospheric pollution across boundaries to injure people in an adjacent region downwind.

Many Canadians hold a deep concern regarding the natural environment in all its complexity. They consider it essential that the varied ecosystems that have evolved in Canada be maintained and that the natural forces of stability and change be permitted to continue unaltered by man. Only in this way is it seen that the full range of future options will be maintained. Within this concept is inherent that no species of natural organism suffer extinction through human action. To these Canadians, the management and use of our abundant fresh and salt waters, the estuaries and deltas, the wild lands, the forests, grasslands, alplands and tundras are viewed in relation to their influence on the total long term wellbeing of the organisms that are essential elements in the systems. To these Canadians, the national heritage is degraded if its biota is depleted and its natural environments altered. This has been an important part of the concern surrounding a number of major developments related to the production and transport of oil and gas from remote parts of Canada.

The current concern for environmental integrity extends also to certain global changes that may have serious consequences on all mankind. Prominent among them are the changes that may be taking place in the physico-chemistry of the upper atmosphere as an outcome of the introduction of some chemical compounds into the atmosphere. Some feared changes could so alter the climate that the economic or physical wellbeing of Canadians could suffer, or indeed that parts of Canada might be no longer liveable.

Information on the status of many phases of the Canadian environment is dispersed widely through the literature but much of the most recent information is available only from the research and management agencies of federal and provincial governments. It is important that Canadians be provided with reliable information on environmental conditions and trends. It was with this purpose in mind that the Canadian Environmental Advisory Council embarked on the preparation of overview

assessments of the state of the Canadian environment. The present report reviews the circumstances in 1976 found in air quality, urban/rural land use, the fresh waters and wildlife species. It summarizes the conclusions of a published Council report on nuclear power development, and contains a précis of a forthcoming study of estuarine resources. Finally, it comments on the policies essential for effective management of the impact of our increasingly industrialized society on all aspects of the environment.

AIR QUALITY IN CANADA - 1976 F. Kenneth Hare

Introduction

Canada is so vast, and its population so small, that air pollution has been seen primarily as a local problem. Most of our airstreams are indeed free from high concentrations of pollutants, and much of the country is subject to little stress from this source.

Nevertheless, in 1974, the total pollution load was 28 million tons, an important part of which does not yield easily to technological control. There is also mounting concern that far-travelled pollutants may affect some of the most densely populated areas, compounding the effects of local emissions. Canada cannot escape the consequences of planetary dispersion of such constituents as the radionuclides from nuclear testing, carbon dioxide from fossil fuel consumption, and chlorine-containing species such as the chlorofluoromethanes, carbon tetrachloride and various organochlorine insecticides.

The year 1976 has seen a substantial growth in response to this mounting concern, with much of the initiative flowing from within the Department of Fisheries and the Environment itself, and from several provincial agencies. Studies of long-range transport of pollutants have been intensified, and there has been further progress towards effective standardization of atmospheric monitoring, especially in the field of precipitation chemistry. The Science Council of Canada has launched a major study of the oxides of nitrogen as part of its *Policies and Poisons* programme, which aims at understanding the response, sometimes unduly slow, of regulatory agencies to pollution threats. All in all, it can be said that official agencies, the scientific community and many sections of the public have become increasingly aware that a major job needs to be done to understand, regulate and where possible to remove the threats posed by these forms of pollution.

Scales of Pollution

Air pollution may have impacts on a wide variety of scales:

(i) At the workplace level, from the domestic kitchen to the asbestos, uranium or arsenic processing industrial plant. On this scale we are concerned largely with indoor or confined workplaces (mines, quarries, smelters, manufacturing plants), and with impact on human health. In 1976, major focus has been applied to asbestos in Ontario and Québec, uranium and other radioactive substances in Ontario, and more generally to the industrial health question across all Canada¹

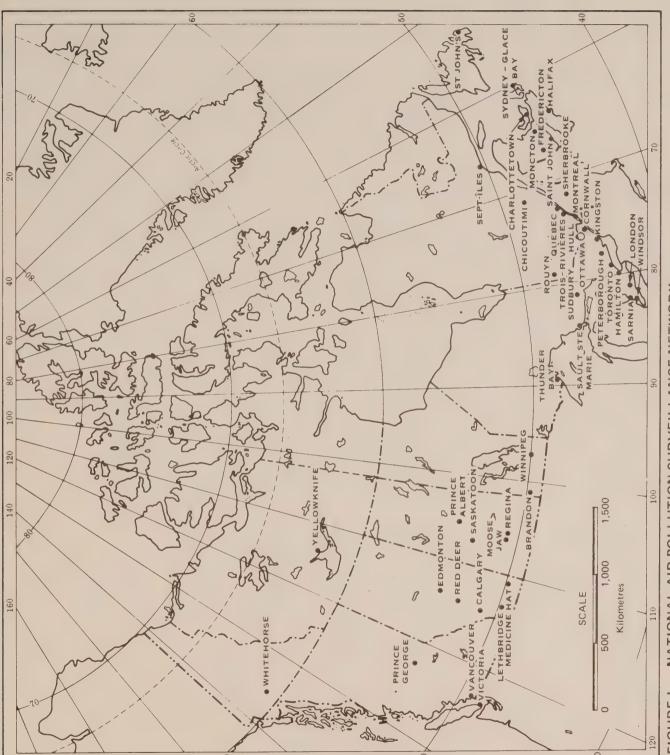
- At the urban level, from city block to metropolitan area. This is the scale that has had most attention in Canada, on which, for example, the Environmental Protection Service (EPS) National Air Pollution Surveillance scheme works. The sources of pollution are smoke stacks, exhaust systems, chimneys, industrial plants, vehicles and waste disposal systems, all characteristically local. The list of pollutants is long, and includes sulphur dioxide, carbon monoxide, hydrocarbons, various oxidants (chiefly photochemical ozone, 03), oxides of nitrogen, particles, often including toxic heavy metals such as lead and cadmium, and a host of trace gases developed for technological purposes, such as sulphur hexafluoride, SF6, used extensively in electrical switching gear. The impacts are on human health, safety and comfort, growth of urban vegetation, water quality, corrosion of structures and machinery, and on the overall attractiveness of living.
- At the regional level, from, say, the Lower (iii) Mainland of British Columbia to the Great Lakes -St. Lawrence - Atlantic Provinces region of eastern Canada. At this level, one is concerned with long-range transport of pollutants; the sources are not local, and often not specifically identifiable. In Canada, trans-boundary transports between provinces and to and from the USA are usually involved. The main concern is with sulphur compounds (usually soluble sulphates) derived from the rapid oxidation of sulphur dioxide, but heavy metals and organic pollutants may also travel substantial distances, as may ozone. Particular concern arises from announced plans in the USA to increase the use of highsulphur fossil fuels in electric generating stations, though present plans call for sulphur removal technology to accompany the increase. The impacts are on crops, natural ecosystems, water quality, and possibly health.

(iv) At the planetary level, where the entire earth is affected, and often the whole depth of the atmosphere. Thus carbon dioxide released from the burning of fossil fuels has raised atmospheric concentrations of this important gas by about fifteen per cent since the mid-Nineteenth Century. Radionuclides injected by atmospheric testing of nuclear devices affect much of the planet. Chlorofluoromethanes and sulphur hexafluoride are distributed world wide, and have been detected in concentrations of parts per billion or per trillion in the middle stratosphere. Planetary pollutants are, as a rule, chemically stable and insoluble gases which remain in the atmosphere long enough (six to twelve months) to be thoroughly mixed by atmospheric turbulence on all scales. The effects are usually subtle, and may remain undetected for years. The potential impact of the chlorofluoromethanes on surface ultraviolet irradiance is a good example.

Current Status in Canada

Under the federal Clean Air Act² (proclaimed Nov.1, 1971), the Minister of the Environment has the responsibility:

- (a) to establish, operate, and maintain a system of air pollution monitoring stations throughout Canada;
- (b) to collect, both through the operation of air pollution monitoring stations and from other appropriate sources, data on air pollution in Canada and to process, correlate, and publish such data on a regular basis;
- (c) to conduct research and studies relating to the nature, transportation, dispersion, effects, control and abatement of air pollution and provide consultative, advisory and technical services, and information related thereto;
- (d) to formulate comprehensive plans and designs for the control and abatement of air pollution and establish demonstration projects, and publicize, demonstrate, and make such projects available for demonstration; and



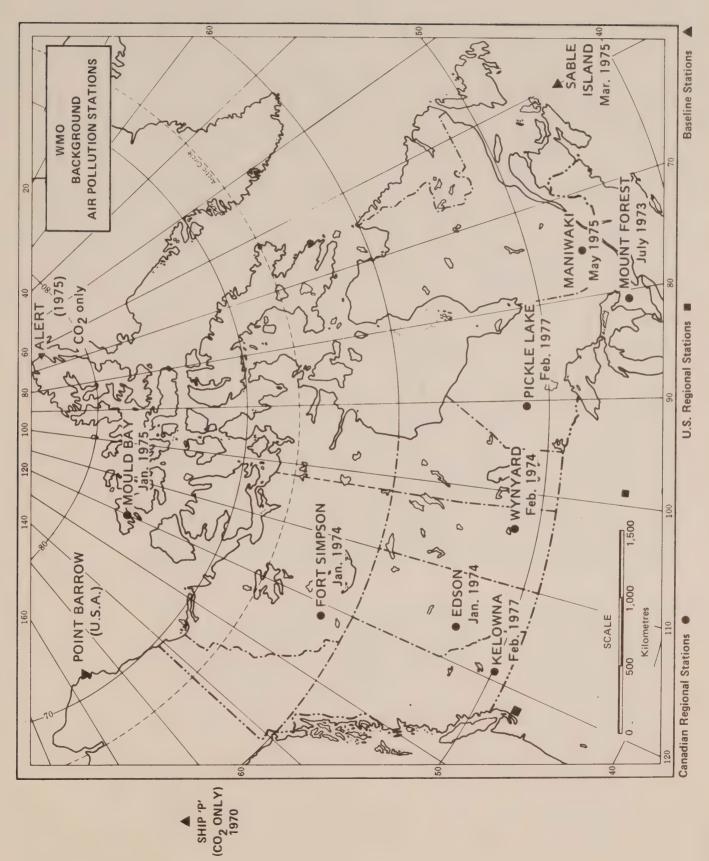
RÉSEAU NATIONAL DE SURVEILLANCE DE LA POLLUTION ATMOSPHÉRIQUE (DÉCEMBRE 1975) NATIONAL AIR POLLUTION SURVEILLANCE NETWORK (DECEMBER 1975) FIGURE 1

(e) to publish or otherwise distribute or arrange for the publication or distribution of all pertinent information that would serve to inform the public of all aspects of ambient air quality and of the control and abatement of air pollution.

These programmes are now well under way and are administered by the Air Pollution Control Directorate (APCD) of the Department of Fisheries and the Environment. Figure 1 shows the National Air Pollution Surveillance Network (NAPS) established under clauses (a) and (b) above. The Department has provided many of the provinces with their monitoring instruments. Most provincial agencies install, operate and maintain the network of stations. The processed data are supplied to the Department. APCD publishes monthly and annual summaries of observations, 3 and a report of activities under the Act as a whole. The Surveillance Network covers soiling index, suspended particles, lead, dustfall, sulphation rate, sulphur dioxide, carbon monoxide, ozone, nitrogen oxides and hydrocarbons. Major problems of design and standardization of instrumentation still exist, but are being actively tackled. In addition, inventories have been prepared for such emissions as asbestos, beryllium, mercury, lead, zinc, cadmium, arsenic, manganese fluorides, vinyl chloride and vanadium. Every two years an inventory is carried out for the more common pollutants, i.e., suspended particulates, sulphur oxides, nitrogen oxides, hydrocarbons and carbon monoxide. In addition to the NAPS, there is considerable monitoring by industry and the Department of certain sources.

The Directorate is also involved in technology development and transfer, in training programmes, and in the establishment of National Air Quality Objectives and National Emission Guidelines and Standards. Objectives have been formulated for sulphur dioxide, suspended particulate matter, sulphur dioxide times particulate, carbon monoxide, oxidants (ozone), hydrogen sulphide, hydrogen fluoride and nitrogen dioxide. The latter include cement manufacturing, asphalt plants, metallurgical coke manufacturing and a wide variety of other industries. National Emission Standards, established when a pollutant presents a significant danger to health, have been established for lead from secondary lead smelters, for mercury from chlor-alkali plants, and asbestos from asbestos mining and milling. Regulation of fuels and fuel additives, and the control and abatement of motor vehicle pollution have also formed part of the Directorate's work.

AES also has a programme of research and monitoring in the air quality area, and is especially active in some of the programmes described later. The service is responsible for the organization



and maintenance of the network of World Meteorological Organization (WMO) background air pollution stations (Figure 2).

Air pollution control lies jurisdictionally with the provinces, except for pollutants which constitute a significant danger to the health of persons, or are likely to result in the violation of an international agreement. Several provinces have active programmes, linked together by the Federal-Provincial Committee on Air Pollution, established in its present guise in 1971. Ontario and Alberta have been especially active in this area. There is also a standing International Air Pollution Advisory Board, reporting to the International Joint Commission. Broader international links are maintained by the Department with the programmes of OECD, WHO, WMO, NATO, ECE, UNEP and UNESCO.

Current Issues

Several specific issues have had much attention in 1976. A brief summary of the major examples follows.

Oxidants. Strong oxidants are often present in regional-scale air pollution. Most of these oxidants are in fact ozone (0₃), created photochemically when solar ultraviolet radiation reaches the surface through "smog" containing oxides of nitrogen and hydrocarbons. Until recently the instrumentation used could not distinguish between 0₃ and other oxidants, but the National Air Pollution Surveillance Network and the Ontario network now (since 1973 or 1974) use chemiluminescent techniques that specifically identify 0₃, which is a highly toxic gas that also attacks certain materials, crops and natural vegetation. The maximum acceptable 1-hour level for 0₃ under the Canadian Air Quality Objectives is 0.08 ppm (160 micrograms per cubic metre).

A report by Shenfeld to OECD⁴ analyses the available records, and shows that the 0.08 ppm threshold is exceeded frequently in outhern Ontario cities, chiefly on summer afternoons, and has so been exceeded in Vancouver and Montréal. Most of this ozone is cought to be created locally by ultraviolet radiation. Shenfeld's port also shows that oxides of nitrogen regularly approach or exceed maximum acceptable levels, and it is their presence that ates the ozone problem. Hydrocarbons, also involved in the pation, are also present in excess. Canada-wide, transportation produced about sixty per cent of both pollutant classes, but offentrations are rarely a problem in rural areas (except when transported from upwind industrial areas).

ronto and Hamilton, however, where high ozone concentrations mmonest, the situation is rather different. A 1974 emission y⁵ showed the following results:

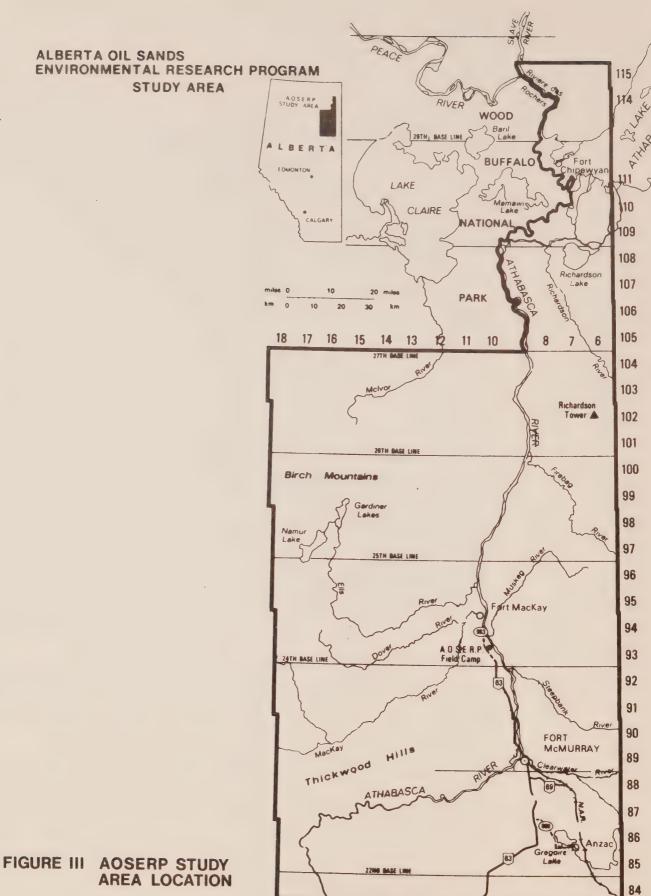
Pollution Source	Percentage attributable to	
((1) Oxides of nitrogen	(2) Hydrocarbons
TORONTO		
Fossil fuel power stati Industrial sources Motor vehicles Space heating All others	lons 40 11 35 13 1	1 26 63 1 9
HAMILTON		
Industrial sources Motor vehicles Space heating All others	85 9 6 1	73 25 1

Shenfeld's report makes it clear that south-western Ontario has an oxidant problem akin to that of Los Angeles, though the frequency and duration of events is much lower in Ontario. Most pollution events occur during stagnant summer weather.

No adverse health effects have yet been attributed to this kind of pollution, but some damage to crops has been known for a long time. Tobacco leaf-fleck and bronzing of white bean crops are well-known effects of ozone pollution. In 1972-73 foliar damage to tomatoes was attributed to another oxidant, peroxyacetyl nitrate (PAN). The areas affected suggest that much of the damage results from air coming across Lakes Erie and St. Clair from pollution sources in the United States.

The Alberta Oil Sands Environmental Research Program⁶. It is clear that large-scale development of the Alberta Oil Sands will present a considerable air quality problem. The oil contains much sulphur, and the local atmosphere is frequently calm and stable for long periods in the cooler seasons.

The Canadian and Albertan governments have combined to set up a joint research programme into the overall environmental implications (AOSERP is the acronym). This group has already carried out some field experiments and has planned many more. AOSERP is controlled by a steering committee that reports to both governments. Its program is coordinated by a committee that includes the chairmen of eight technical research committees (aquatic fauna, human environment, hydrogeology, hydrology, land use, meteorology and air quality, terrestrial fauna and vegetation). Work got under way in 1975, when \$3,500,000 was expended. Figure 3 shows the area of operations.



WEST OF THE FOURTH MERIDIAN

In the area of meteorology and air quality, the work is aimed at the development of baseline climatological and air quality data, a better understanding of the relevant pollution processes, and simulation models of ambient air quality, pollutant transport and deposition. In 1976 a meteorological tower was installed at the base camp (see Figure 3) and instrumented suitably. An intensive field experiment was carried out in March. The chemistry of snow (i.e., pollutant content) in the area was also studied. In all, twenty sub-projects are being carried out, eleven by staff of the Atmospheric Environment Service. On the provincial level, considerable effort was expended in 1976 to improve the accuracy of the air quality data through more accurate calibrations and better instrument features.

The project is of high interest, because it is the first intensive examination to be carried out in a northern Canadian environment of a pre-pollution situation (except for very local effects) in an area of high pollution potential.

Long-Range Transport of Air Pollution. The regional scale of air pollution involves the long distance transport of dispersed pollutants. Of these sulphur dioxide and its oxidation products are the most important. The tendency to increase stack-height, so as to reduce local pollution, results in longer distance downwind travel. The Departmental philosophy prefers containment at source, using best practicable technology, and local dilution should be contemplated only as an interim measure when control technology does not exist. Sulphur dioxide is quickly oxidized into soluble sulphates under such long distance travel. These may form small particles capable of deep penetration of the human respiratory system. They may also render falling rain more acid.

Major concern has been expressed during 1976 over this form of pollution, because of announced plans to relax sulphur content restrictions on fuels used in thermal power plants in the USA. Unless rigorous cleansing of exhaust gases is carried out at source, the emission of sulphur dioxide from the north-eastern states is likely to increase fourfold in the next decade. Southern Ontario, the St. Lawrence Valley and the Maritime Provinces lie downwind from part of the emission area. There is evidence that the acidity of precipitation over these regions has already risen significantly. A study by Munn⁸ has also shown a progressive increase in haze (an indicator of high particle load) since 1953 over Atlantic Canada, especially in New Brunswick. Model calculations of sulphate deposition over the Great Lakes in 19749 shows that the rich agricultural areas of south-western Ontario are already subject to loadings of 2.0 to 2.4 micrograms per square centimetre per day, as compared with 0.4 in the Lake of the Woods-Nipigon district. The potential and actual impact of these

depositions on water quality, soils, and vegetation may be considerable, and has been examined in detail by the Ontario Regional Board of the Department of the Environment¹⁰. The impact is harmful in areas where soils already tend to be acid. In limestone areas, sulphate deposition may actually be helpful.

The Department has recently decided to launch a study of these effects, so far by reallocating resources. There is a need to intensify the observational network for precipitation chemistry. In view of the widespread impact of such regional scale pollution – already a matter of deep concern and international action in Europe – all the Services may be expected to contribute to such a programme. It is also clear that major bilateral problems of management arise between Canada and the United States.

Oxides of Nitrogen. Reference has already been made above to the large-scale emission of oxides of single nitrogen (NO and NO $_2$) by car exhausts and thermal power stations, and to the key role of such oxides in the photochemical synthesis of oxidants.

In 1976, high visibility has been given to the possible role of these oxides in problems of human health and well-being, thanks to an initiative by the Science Council of Canada. This study is part of a larger investigation called *Policies and Poisons*. Background studies have been completed, but not yet synthesized and edited for publication.

RECOMMENDATIONS

- The National Air Pollution Surveillance Network should be maintained and, where necessary, strengthened. Publication of its material is of high importance to both the research community and those concerned with regulation and control of specific pollutants.
- 2. Maximum possible resources should be devoted to the study of the long-range travel of air pollutants, and to the analysis of their impact on natural ecosystems and crops.
- 3. Specific environmental impact studies, of the sort typified by AOSERP, will be needed for many large scale development projects in future years. This will severely strain the country's resources in trained persons.

REFERENCES

- 1. e.g., Royal Commission on the Health and Safety of Mine Workers (Report issued August 23, 1976).
- 2. Environment Canada, 1975: The Clean Air Act, 1974-75 Annual Report, Environmental Protection Service, Ottawa, 13 pp. (annual periodical).
- 3. -----, 1974: National Air Pollution Surveillance, Environmental Protection Service, Ottawa, 181 pp. (annual periodical).
- 4. Shenfeld, L., 1975: Report on oxidants in Canada, paper prepared for a Workshop on Photochemical Oxidant Air Pollution and its Precursors in the Atmosphere, OECD, Delft, not paginated.
- 5. Ibid.
- 6. Alberta-Canada, 1975: Alberta Oil Sands Environmental Research Program, First Annual Report, Edmonton, 58 pp. (annual periodical).
- 7. Cogbill, C.V. and G.E. Likens, 1974: "Increasing extent and severity of acid precipitation in eastern North America", Water Resources Research, 10, pp. 1133-1137.
- 8. Munn, R.E., 1973: "Secular increases in summer haziness in the Atlantic Provinces", *Atmosphere*, 11, pp. 156-161.
- 9. Acres Consulting Services Limited and Applied Earth Sciences Consultants Inc., 1975: Atmospheric loading of the upper Great Lakes, Canada Centre for Inland Waters contract report, 3 vols.
- 10. Environment Canada, 1976: Long-distance transport of atmospheric pollutants, Ontario Regional Board, 34 pp., mimeo.

The five environmental laws described above represent the response of Congress to the determination of specific segments of the nation's environment. None deals directly with the central issue affecting environmental degradation—how the land is used. The laws are, however, stepping-stones toward a national land use policy. 1

THE ENCROACHMENT OF URBAN DEVELOPMENT ON PRIME FOOD LAND Norman H. Morse

Land use planning, like many other aspects of environmental planning, can be defined broadly or narrowly. In this discussion, the focus will be on a particular aspect of land use in Canada: the encroachment of urban development on prime food land. This process is very much in evidence in the Golden Horseshoe area of southern Ontario and the lower Fraser valley and delta in British Columbia. With reference to Canada as a whole, one author concludes that in the Prairie Provinces, the need for a policy directed towards the preservation of farm land scarcely exists. In the Maritime Provinces, and in areas bordering the Canadian Shield, agriculture is said to be disadvantaged and a preservation policy not appropriate. In Southern Ontario and British Columbia, land preservation is considered appropriate, but it is not clear what policies should be adopted; that is, whether differential taxation policies for agricultural and non-agricultural land, regulation, the creation of an agricultural estate, or some other form of control or combination of policies should be pursued.2

Between 1951 and 1971, agricultural land acreage in British Columbia expanded by 1.12 million acres, but this increase is explained largely by a gain of 960,000 acres in the Peace River-Liard census division. During the same period, losses in the Lower Fraser were 90,000 acres, a reduction in acreage by one-third. It was the likelihood of the loss of most, if not all, of this valuable land to agriculture which led to British Columbia taking steps to retain land in agriculture by designating agri-

cultural land reserves and establishing a Land Commission as a statutory body with functions separated from those of the Department of Agriculture. The Land Commission was provided with a fund of \$25 million to purchase land freely offered to it.

The productivity of considerable acreage in the Fraser valley below Hope can be enhanced. But this land, like that in the Okanagan, is high-cost land. On lands along the lower Fraser, drainage systems are required to reduce the effects of winter runoff, as well as to facilitate irrigation. The expense of irrigation in the Okanagan Valley makes this high cost land, when all costs are considered. A decision to supply residents with water in order to enhance revenues to offset costs of irrigation apparently has favoured residential and industrial development and intensified the rural/urban interface. A consequent rise in land values, by enhancing the capital value of orchards and vinyards, increases annual overhead costs and, together with higher wage rates and cost of containers than in the United States, has resulted in fruit farming in the Okanagan becoming more expensive than in the northwestern United States. To some extent, therefore, attempts to support agriculture in the Okanagan have been nullified both by the general economic development of the region itself and by those forces which determine interest, wages, and prices in Canada relative to the United States. Suitable land in the Okanagan represents .01 per cent of the area of British Columbia and is the only district west of Ontario where tree fruits can be grown successfully in Canada in quantity.

In southern Ontario, 13.7 per cent of land in farmland in 1966 was not in production in 1971. This trend is continuing. The Ministry of Agriculture and Food believes that the marketplace should be allowed to operate as much as possible and that the amount of land transferring out of agriculture and into urban development can be restrained by various measures such as zoning, differential tax policies, and so forth. An effort is made to work closely with municipalities so that the use of land reflects local wishes. 5 Although decisions at the local level result in the withdrawal of land from agriculture, the Ministry does not believe that much of the land is permanently lost. Instead, it is expected that much of it will return to agriculture when prices and costs are more favourable. One calculation indicated that between 1966 and 1971, land was transferring out of agriculture at the rate of 26 acres per hour. This period was, however, one of low farm income. Some of this land, since 1971, has been brought back into production of field crops. Although much of the remainder is regarded as lying in reserve, as it were, resting in woodlot, recreational, or other undefined use, the Ministry has recently established a Food Land Development Branch whose goal is to retain high capability agricultural lands in food production.

Ontario occupies a critical position in respect to the preservation of farm land since more than half of Canada's 10 million acres of Class 1 land and about one-sixth of Canada's 40 million acres of Class 2 land occur in the province. Ontario has about 20 million acres of Class 1, 2, 3 and 4 land according to the Canada Land Inventory. In addition, 12 million acres of lower class land are also available. Ontario has the largest population of any of the provinces and it has been growing rapidly, especially in southern Ontario. One projection is that, by 2000, the population will increase from the present 8 million to about 12 million, or by approximately 50 per cent of the anticipated increase in the population of Canada.

Population and economic activity will continue to concentrate in areas which reflect the availability of energy. 8 Ontario may lose ground relatively in this regard because of the consideration being given to heavy reliance on nuclear energy towards the turn of the century. 9 Nevertheless, on the assumption that the projected increases in population in Ontario do materialize, and that a density of 20 persons per acre is maintained in urban areas, 310 square miles will be needed for space for the additional population in urban settings. This area is equal to about 10 per cent of Class 1, 2, 3 and 4 land in the province. Allowing for infrastructure such as roads and transmission lines, a total of 400-580 square miles will be needed. If all of this occurs on Ontario farmland, $2\frac{1}{2}$ per cent of the best land will be taken. The Golden Horseshoe area is a particularly vulnerable region. It is unclear what the percentage loss of Class 1 and 2 land, and what the losses in the Golden Horseshoe, would be.

It is evident that except for particular locations elsewhere, especially in British Columbia and around Montréal, issues surrounding the preservation of farmland in Canada stand out in boldest form in southern Ontario. For in Canada as a whole, while the total area of occupied farms declined from 174.9 million acres in 1951 to 169.7 million acres in 1971, the area of improved farmland increased from 96.9 million acres to 108.2 million acres. 10 The Canadian farm contracted in the East and expanded in the West. From the standpoint of the area of occupied farms, losses in the Maritimes exceeded 50 per cent. There were losses also in Québec and in Ontario, whereas gains in the Prairie Provinces and in British Columbia were 7.8 per cent and 23.8 per cent respectively. The overall decline in the area of farms was concentrated in the period 1966-1971, which was marked by a large decline in acreage in Ontario. The 1976 census will demonstrate changes since 1971. However, from the standpoint of food production it is acreage of improved land and not the area of occupied farms that is relevant. Even here, improved land may fall within any of the several classes. Hence detailed knowledge of the capability and use of improved land is necessary in order to determine whether an increase in acreage represents a significant gain, or a loss in acreage a significant decline in potential food supply.

The Minister of State for Urban Affairs has voiced a general concern over the anticipated loss of agricultural land in Canada during the next quarter century. The addition of an estimated 8.2 million people to the Canadian population by 2001 will require another 2,000 square miles at present densities. This estimate is based on a lower density figure than the Ontario estimate, but the amount of land required is comparable to the 1,780 square miles of improved farm land that went out of production in Ontario between 1966 and 1971. Historically, about half the farm land that has been lost to urbanization has come from the best five per cent of soils. Accordingly, it is asserted that we cannot afford to lose another 1,000 square miles of prime farm land to urban development that could almost as easily locate elsewhere. In addition, we may choose to settle more densely. Ninety per cent of the Canadian population now inhabits seven per cent of the nation's land, or approximately 270,000 square miles. This area is larger than that of the United Kingdom, Federal Republic of Germany, Switzerland and Benelux combined. These countries have 150 million people living under conditions similar in many aspects to those in Canada. 12

Apart from ethical questions, whether we can or cannot afford to lose additional prime farm land is a matter of setting priorities and the weighing of benefits and costs of one line of action or another. It is a politico-socio-economic problem 13 - a problem of choice - and its resolution will probably differ, depending upon whether we leave decisions with individuals or whether the decisions are made collectively as a social choice. If we do not set social priorities explicitly, they will be implicit in the way we organize ourselves in handling the situation. Ends and means are closely related and fall into the one category or the other depending upon how we look at the problem. For example, if we adhere to the price system and to local (or individual) decision-making as ends, the allocation of land to agricultural or non-agricultural uses will probábly be different than if national priorities can somehow be developed. The development of national priorities is virtually impossible, since the control of land falls within the jurisdiction of the provinces, and this in itself says something about the Canadian ranking of priorities. On the other hand, if we develop a policy which adheres to the preservation of farm land as an end, resort to the price system as means may well have to give way, as in British Columbia, to regulation supported secondarily by some price and compensatory payments considerations.

Although it seems rational to be concerned about the further loss of land to agriculture, the perplexing feature of the situation is that the tendency towards surplus production is still very much in evidence, even with respect to the specialized crops grown in the vulnerable agricultural areas. Prices of agricultural products

fluctuate, but the long term rise in agricultural prices in Canada is not yet essentially a result of a chronic shortage of land. There is debate over the loss of peach orchards and vinyards in the Golden Horseshoe. Yet peaches and grapes can still be heavily produced, even to a point that calls for provincial assistance in disposing of the crop. A tendency towards surplus production causes some producers to want to sell their land. To require that the land remain in agriculture without considering the economics of continuing production on it comprises only a partial assessment. What are the gains from alternate uses of the land compared to the losses from not retaining it in agriculture?

An actual diminution of production of specialized crops in the vulnerable areas, such as Southern Ontario, does not necessarily mean that an overall decline will occur for some time to come. It is probable that other areas will be able to fill a considerable gap. Fruit from southern Ontario is ready for market earlier than similar crops from other supply areas. When supplies from other areas become available, prices fall. Since the Canadian market comprises a free trade area, the chief barrier to interprovincial trade is the cost of transportation. There are no regional provincial exchange rates since there is a common currency. The upshot is that a tendency toward surplus in Ontario prevents other areas from producing a range of similar products in larger quantities than at present. The point is that an actual decrease in production in the Golden Horseshoe need not seriously reduce the freedom of choice of Canadian consumers for products from that region, although the filling of the gap domestically might occur two weeks later than Ontario supplies are normally marketed. Continued development in plant breeding already promises to enhance the potential of other areas at a time when southern Ontario, the Okanagan, and the lower Fraser valley and delta are confronted with high land values which are a determining cost factor from the standpoint of agricultural production.

In addition, loss of agricultural land need not result in its total loss for the growing of food. Again, this is a matter of individual priorities, so long as the institution of private property applies to land. Individual garden plots can produce a great deal of food when intensively cultivated. Depending upon the size of urban properties, or the density of urban settlement, gardens can be grown by families on their own land in cities if they want to do so. In an era of rising energy costs, the growing of home gardens may become a substitute for travel, weekends at the lake, and so forth. However, if a consequence of a permissive society is that even home gardens are subject to being raided while the owners are away, a solution to ensuring a plentiful supply of relatively cheap food may be the designation and effective protection of agricultural land so that production in fact can be carried out with reasonable protection of property.

Problems do arise along the interface between urban and agricultural land, especially if the distribution of these two uses is a patchwork. Farm odours, noise of machinery, and the use of machinery during the day often irritate urban dwellers. Conversely, urban activity often is disadvantageous to agricultural activity which involves the movement of animals and farm machinery. The conflict may be covert, but it frequently becomes overt. When urban dwellers outnumber the agricultural members of a region, a public vote may well lead to the succumbing of agricultural activity to urban demands. Also, with a growing population and market, the scale of economic activity on individual farms may render them incompatible with urban surroundings. Thus a middle-of-the-road approach which results in a mixture of urban and agricultural land use in close proximity to one another has not proven satisfactory.

Whatever its dimensions, urban encroachment on prime agricultural land is essentially a domestic problem for Canadians. Urban encroachment scarcely exists on the prairies, an important, though not the major world source of cereals and feed grains. In no way can Canadians supply more than a modest percentage of world food needs unless some unforseen technological breakthrough particularly appropriate to Canada occurs. While Canadians can modify their diet by reducing their consumption of red meats, eggs, and the like, and shifting more to cereals so that the produce of land is used more directly as human food rather than indirectly through animals, the maintenance of good condition of the soil requires resort to animal husbandry in many instances and precludes a complete shift to vegetarianism supported by the use of commercial fertilizers alone. It is recognized that a large percentage of the world's population is undernourished but the undernourishment is not yet severe enough to preclude population increase. If there is no way of stopping the increase and no way of causing Canadians, both rural and urban, to place in top priority the production of food to nourish the additional population elsewhere, the so-called world food problem must be resolved on a different plane than that of Canadian land use alone. Perhaps a unitary state or a unitary world could develop a general policy concerning land use more readily than a federal state or a world of nations, but it is certain that an upper limit to the world's population from the standpoint of food supply will be reached earlier than if a positive policy requiring the preservation of food land were adopted. On a world scale as on a national scale, there appears to be a trade-off between the preservation of farm land, possibly at some inconvenience to prospective home owners, and the encroachment of settlement on farm land, possibly at greater convenience to such owners, although the latter option, like the expanding boundary of the Sahara, implies a smaller food supply base and hence a potentially smaller population. If farm land is preserved, food will probably be relatively cheaper and other things relatively dearer whereas if settlement is allowed to proceed, the opposite situation would apply. Thus not only a partial answer to the Malthusian question but also some aspects of the distribution of wealth and income hinge upon land use policies that are pursued nationally and in the world at large.

General Conclusions

- 1. In the literature surveyed, urban encroachment on prime agricultural land is regarded primarily as a socio-economic rather than as an environmental problem. Further, the loss of agricultural land appears to be essentially a domestic issue without significant direct connection to the world supply and demand for basic food items such as grains.
- 2. Given that we live in a world of uncertainty stemming in part from scientific development and technological change, we cannot fully know what options will exist over time. Continuing research on plant and animal breeding and the modifications of technique, in some cases in the direction of what has been called intermediate technology, will open new opportunities. On the other hand, the loss of agricultural land to urban development probably precludes its return to agriculture at some future date because of the expense or social cost. Since we are confronted with a seemingly irreversible process, reliance on market mechanisms under present settlement thrusts seems to result in an institutional failure to retain prime agricultural land intact. As a method of obtaining an estimate now of what the price of agricultural land, and hence capital gains or losses, will be at some future date, perhaps the market for land could be broadened into a spot and futures market. However, the time horizon appears too great to operate such a commodity market in land. In addition, non-homogeneity of land and the circumstances surrounding it result in further difficulties in obtaining valuations now for land for specific uses at specific future points in time. High futures for land for agricultural uses would favour its retention for these purposes. And high distant futures relative to shorter and intermediate futures would reflect the present estimation of impending future scarcities.
- 3. The question is: Under what conditions and in what manner will a society take steps in advance of a possible food shortage to ensure a larger supply in the future insofar as the future supply will be determined by the amount of suitable land that is kept available? Fluctuations in agricultural output can be expected, but evidence of shortages of traditional products or an overall downward trend in production has not yet occurred in Canada. Whether or not an agricultural crisis exists in Canada is a matter of judgement. Hence policy decisions will tend to be postponed. The different approaches to agricultural land use in British Columbia and Ontario seem to reflect differences in economic and social philosophy as much as differences in physical conditions. Furthermore, an urban setting need not be reduced to a zero option respecting the production of food whereas an agricultural setting does not enjoy infinite options. Thus the preservation of land is not a total gain nor its loss necessarily a total loss from the standpoint of food supply.

4. If somehow a decision is made to protect agricultural land (presumably this will be a provincial decision in Canada with federal cooperation), questions will be: a) How far to go? and b) What measures shall be adopted?

With respect to the first, ideally the objective should be to maximize net social benefits. But since these magnitudes tend to defy identification and measurement, the argument will probably revolve around questions such as: Should all the agricultural land in all the provinces be reserved, or should the restrictions apply only to Class 1 and Class 2 land? How much land in these two categories must there be in order to merit its preservation? A relatively small area without a distinguishable natural boundary may be disadvantaged because of potential conflict along the agricultural/urban interface. In any event, the difficulty of establishing criteria for making decisions can be illustrated. To say that the more that agricultural land is lost the more important it is to retain what is left may be confronted with an opposing proposition; namely, the less that is left the more difficult it is to retain it, owing either to the rural/urban interface or to certain diseconomies associated with a small activity.

With respect to the second question, the loss of agricultural land can be prevented by regulation (which is largely a provincial and municipal matter within the geographical areas comprising the provinces), by subsidization of agricultural activity and the maintenance of a land bank to offset encroachments, or by subsidization of settlement and development on non-agricultural land, or by some combination of all three approaches. The subsidization of agriculture or maintenance of a land bank could be compared with the cost of subsidizing development on nonagricultural land. Canadian reaction to féderal agricultural policies suggests a reluctance to unduly support agriculture, but this does not necessarily mean that a predominantly urban society would not support the subsidization of urban development on non-agricultural land. Regulation, on the other hand, appears to be the cheapest course from the point of view of the public purse since it results in the costs and benefits of a change in land use rules being distributed in one way or another among firms and households new and old.

5. A change in land use regulations will alter the position of prospective, relative to established, homeowners and commercial and industrial establishments. For if urban encroachment on agricultural land can be regarded as the least cost way to acquire and develop a property from the private (or micro) point of view, a halt to this trend will have numerous effects, one being a rise in value of established properties which presumably are, on the whole, advantageously situated. Will

prospective property owners claim on equity grounds some compensation for the disadvantages stemming from a change in rules that produces at the same time windfall gains to established owners? Or can they be expected (or required) to accept the new situation as representing a new form of constraint attributable to the existence of a large and increasing number of people? Will those who happen to be "born thirty years too late" become a class of second-class citizens? A tax on the windfall gains from rising capital values accruing to established property owners in order to compensate prospective property owners would result in hardship for the former unless their incomes also rise sufficiently to compensate for the tax. There is no assurance that this change would occur. To compensate established property owners in order to offset a tax, the proceeds of which are to be used to compensate prospective property owners, is rather farfetched. Nevertheless, it is frequently the case that when development occurs, such as the expansion of a metropolitan area, the established parts share in the carrying of the debt incurred when water, sewage, streets and sidewalks are supplied to the new districts. This manner of operations is not in strict conformity with the principle that it is the polluter who pays. The prospective property owners, the new "polluters", who will be altering the landscape, are in part supported by the established "pollutees."

The reserving of land for agricultural use also raises questions concerning the profitability of agriculture on the zoned land. Even in the most vulnerable areas, such as in the Golden Horseshoe, some owners wish to withdraw from agriculture because it does not pay them to stay in it. Their holdings may be small or costs too high relative to revenues. Revenues may be the lower because of a tendency towards surplus production, and costs may be higher because of general economic policies which affect the cost of inputs. Thus, if landowners want to sell, perhaps to realize capital gains for retirement purposes, a social option is for the state to buy up the land, as the British Columbia Land Commission is empowered to do, and to hold it as a land bank, perhaps meanwhile permitting its use in a manner that does not preclude its return to agriculture at some future date. However, a number of issues will arise, especially with respect to the prices to be paid for land that is purchased. To pay a price equivalent to the highest alternative available to the farmer could lead to the creation of fictitious alternatives in order to obtain high prices. To set a price equivalent to a bona fide development price would be a means of testing the determination of society to maintain the agricultural option. To set prices lower than this, perhaps signifying a cheap food policy (akin to a low bank rate as a signal for an easy money policy) amounts to the expropriation of part of the wealth of a particular group in the social interest. It would seem that society as a whole should pay for what

is regarded as being in the social interest rather than to throw the bulk of the burden on one group.

If the objective is to keep all remaining agricultural land intact and in full production, another range of questions arises. The purpose may be either to ensure a plentiful domestic food supply or to contribute as much as possible to world food supply by enhancing Canadian exports. In the first case, all farm prices may be depressed as a consequence of high production and this would result in reduced farm incomes all round. In the second case, if exports were profitable the land probably would now be used in that manner. The fact that this is not occurring suggests that there would have to be a public policy of assisting the producers to produce these agricultural products for export. Also, conditions in the receiving countries should be kept in mind because there have been cases of food exports from developed countries undermining agricultural producers who may be a large percentage of the population of the receiving countries, particularly in the Third World.

It is evident that if agricultural land is to be preserved, a determined effort must be made to do so, and this objective must become part of the value system and policy of Canadians. The choice now confronting Canadians is whether to adopt this objective while agricultural land is, in a sense, still in surplus as evidenced by its capacity to produce a rather wide range of products in excess of what is deemed economic. When this slack is removed from the system as a consequence of population increase and an increase in the demand for food, Canadians will probably then be even more conscious than at present of the role of the price of food in determining the level of the consumers' price index. However, since a large proportion of the price of food is accounted for by the handling and merchandizing of food products subsequent to their primary production on farms, an agricultural land use policy will not be the sole determinant of the price of food. The formation of a national policy respecting land use will undoubtedly be delayed in Canada since jurisdiction over land rests largely with the provinces. Nevertheless, the Department of Fisheries and the Environment can promote discussion with and among the provinces so that a continuous assessment is made, and instruments put in place to preserve land for agriculture as soon as the objective is acceptable.

Recommendations

The Canadian Environmental Advisory Council interprets the mandate of the Minister of Fisheries and the Environment to include responsibility for the protection and enhancement of the quality of the natural environment including water, air and soil quality; and by extension, for leading and coordinating the development of federal land use policy initiatives, and for undertaking consultations with the provinces on national land use problems, objectives and policies.

Accordingly, Council has made the following recommendations:

- 1. The Department of Fisheries and the Environment should initiate and coordinate discussion with other federal departments and the provinces concerning the contemporary situation in Canada respecting land use and policies affecting land use, in particular concerning urban encroachment on agricultural land, and should make a comprehensive assessment of trends.
- 2. The Department should recognize and accept responsibility for carrying out evaluation of land use in relation to land capability, including evaluation of alternative ways of managing and controlling the use of land, and should develop reports and publish the findings.
- 3. The Department should maintain up-to-date information on, and continuous assessment of trends and actions in, other countries, not only for purposes of general information but also to assist in the assessment of Canadian policies and actions from both the domestic and international points of view.
- 4. In order that these responsibilities be met effectively, the Department should provide and maintain the necessary organization and resources.

REFERENCES

- 1. Pamela C. Mack, "Federal Environmental Laws: Piecemeal Land Use," in Management and Control of Growth, Vol. III, edited by Randall W. Scott et al., (Washington, D.C., The Urban Institute), 1975, p. 425. The five environmental laws are The National Environmental Policy Act (NEPA), 1969; The Clean Air Act, 1970; The Federal Water Pollution Control Act, 1972; The Noise Pollution Control Act, 1972; and The Coastal Zone Management Act, 1972.
- 2. Edward C. Gray, A Preliminary Paper on Canadian Agricultural Land Use Policy, Reference Paper No. 3. School of Agricultural Economics and Extension Education, University of Guelph, February 1974, pp. 115-117.
- 3. Ibid., p. 38.
- 4. A Strategy for Ontario Farmland, A Statement by the Ministry of Agriculture and Food, March 1976, pp. 4-5.
- 5. Ibid., p. 9.
- 6. Ibid., p. 4.
- 7. Foodland: Preservation or Starvation, A Statement on Land Use Policy by the Ontario Institute of Agricologists, June 23, 1975, p. 10.
- 8. J.H. Dales, Hydroelectricity and Industrial Development in Quebec, 1898-1940, (Cambridge, Mass.: Howard University Press) 1957.
- 9. See: Royal Commission on Electrical Power Planning, Nuclear Power in Ontario. Paper #1, September 1976, p. 13 and Appendix A.
- 10. Lewis A. Fisher, Canadian Agriculture and the World Food Problem. (Montreal: Howe Research Institute) March 1976, p. 18.
- 11. Urban Settlement in Canada, Ministry of State for Urban Affairs, May 1976, p. 98.
- 12. Loc. cit.
- 13. A discussion paper prepared for the Canadian Council of Resource and Environment Ministers by the Land Use Task Force (no date) adopts this approach.

THE STATUS OF CANADIAN WILDLIFE - 1976 Ian McTaggart-Cowan

Canada in the 1600's had a rich and varied fauna including about 190 species of mammals, 500 species of birds, 43 reptiles and 44 amphibians. In the intervening three centuries eleven species or major subspecies have apparently become extinct through the activity of man (Newfoundland wolf, sea mink, sea otter, black-footed ferret, northern kit fox, Queen Charlotte Island caribou, great auk, Labrador duck, wild turkey, passenger pigeon, timber rattle-snake), five to overkill, two as a secondary consequence of other killing activities and four to unknown causes. In addition, two species of fresh water fishes from the Great Lakes, the blue walleye and the deep-water cisco, are probably extinct as a consequence of pollution, overfishing and the introduction into the lakes of the marine lamprey.

Through these years we have greatly altered perhaps 25% of the Canadian landscape, thus removing much of the habitat of those species associated with the later stages of plant succession in the more southerly and productive parts of the country. It is difficult to determine with certainty the relationship between human activity and wildlife populations in Canada. In northern climatic areas, resident species are subject to great fluctuations in numbers as a consequence of year-to-year changes in the aspects of weather that directly influence winter survival. Depth and duration of snow cover, occurrence of freezing rain and unseasonable cold are among the most important. Intrinsic cycles may also exist. It is easiest to identify those species that have gone to extinction. For the seals, larger whales and the fur-bearing mammals, commercial interest has stimulated the accumulation of reasonably reliable data over a long enough period that trends in numbers are apparent. An interest in the game birds and the larger mammals generated by a concern to retain huntable populations has also produced data as to numbers and trends. For most other species there are few data, but those for birds are somewhat more reliable than those for other forms of vertebrate animals.

In general, all large mammals were seriously reduced in numbers in the days of early European settlement. Since then, some species, particularly those that thrive in cutover lands and along the edges of settlement, have increased in numbers. Some species, such as the white-tailed deer, black-tailed deer, red fox, coyote, meadow vole and many birds have prospered in contact with agriculture and deforestation, and may be more numerous now than they ever were. Populations of the surviving species which used the prairie grasslands and shrublands, the American bison, American pronghorn, the plains population of grizzly bear, buffalo wolf and greater prairie chicken have suffered most. The prairie chicken may have gone full cycle, increasing in Canada after the reduction of the bison per-

mitted its special habitat to develop and then declining through human impact. It could hardly be otherwise as burgeoning human populations required the prairie lands for extensive agriculture. The bison survives as a few thousand individuals in National Parks, the wolf and grizzly which preyed on them are gone. The antelope persists, but in greatly reduced numbers.

In Canada, the responsibility for the wellbeing of most of the fauna rests with the Provinces. The Government of Canada has jurisdiction over the migratory species of birds, the marine mammals, the marine fishes and over all wildlife in the National Parks, Yukon Territory and Northwest Territories. It meets this responsibility within the Department of Indian and Northern Affairs and the Department of the Environment.

Most provinces maintain government departments of natural resources charged, among other things, with managing the wildlife within the province. In general, the provincial interests rest primarily with the game birds and mammals, and with the fur-bearing mammals. Few provinces attempt to monitor the state of the less conspicuous species. The Canadian Wildlife Service, at the research end, and the Territorial Administrations, in management, fulfil the roles in the Yukon and Northwest Territories that the provincial departments do in the provinces. The Canadian Wildlife Service and the National Museum of Natural Sciences are building up a body of data on the distribution and abundance of all birds Canada-wide. The Department of Fisheries and the Environment is responsible for the conservation of whales, seals and anadromous fishes throughout the country. National Parks are special protected areas for all forms of flora and fauna. A growing problem with their role is that few of them are large enough to maintain self-perpetuating populations of the larger mammals and birds. They do, however, have sufficient area that they can maintain viable populations of many smaller species. Special refuges have been established on both east and west coasts to protect the nesting colonies of many species of marine birds, though these remain highly vulnerable to oil spill disaster.

The migratory birds are protected under the terms of the Migratory Birds Convention Act, regulations governing the shorebound seals and small whales exist at both national and provincial levels. The conservation of seals and whales on the high seas is subject to international negotiation.

Many of the wildlife species that have experienced marked declines in their numbers have done so because of the destruction of the environments to which they were adapted. Introduced disease, new predators, disturbance and overkill have been other man-imposed causes for declines of other species.

In general, the Canadian fauna is in good condition largely because so much of Canada has not yet experienced alteration of ecosystems beyond the capacity of wildlife to adapt. There is no doubt that a few species, especially those of lands converted to agricultural use, have experienced massive declines in numbers, but with several exceptions substantial surviving stocks remain. Most game species have been reasonably well conserved thanks to the interest of sportsmen and private conservation organizations in fostering the development and maintenance of professionally staffed wildlife management and protection agencies, both provincial and federal. Private groups such as Ducks Unlimited also have had important influence. Most provinces have sportsmens federations and some of them well organized natural history societies that speak out on behalf of conservation of wildlife. In recent years, the Canadian Nature Federation and the Canadian Wildlife Federation have focussed attention on conservation matters on a national scale. of the Canadian universities have been undertaking research aimed at improved wildlife management as they trained the professionals required for the task.

It is safe to say that for most of the smaller species of organisms, including the smaller birds and mammals, the reptiles and amphibians, the fishes and all the invertebrates, there is almost no information as to present or past status. For these the only approach that will provide the likelihood that they will survive is the preservation of the ecosystems in which they live. Research at the National Museum of Natural Science has revealed a number of rare or endangered mollusca. These have been included in the listing in this report.

Birds

It is not possible to document changes attributable to man in the populations of most species of birds in Canada. This is largely because we have so little information as to primitive numbers or about the year-to-year changes in population that characterize the natural circumstances for most species. A continent-wide attempt to obtain such details for some avifauna is administered in Canada by the Canadian Wildlife Service. There is need to extend its coverage so that in future we will be provided with needed information on changes in bird populations.

Where major ecosystems have been greatly altered so also have the faunas. Thus, in parts of British Columbia, Ontario and Québec in particular, deforestation has reduced the species that require mature forest and encouraged those adapted to second growth conditions. In south central British Columbia, agriculture has preempted so large a part of the valley bottom ecosystems that some species such as the burrowing owl are extirpated in the area. Species of the long grass and short grass prairies are now fewer than before these ecosystems were extensively cultivated. In most cases, however, these species are still abundant in some areas.

The use of chemical sprays in agriculture and in forest protection has had an important impact on some species. Though forest spraying, especially that for spruce budworm control, has killed millions of birds, none are known to be and few suspected of being, scarce as a result. On the other hand, several species or raptorial birds and fish eaters are known to have accumulated in their body tissues the residues of chlorinated hydrocarbon sprays that were widely used in Canada and elsewhere until the early sixties. The result for these species has been failure to raise young, and this has led to significant widespread decreases in such species as bald eagle, peregrine falcon and perhaps some populations of merlin.

Insectivorous and seed-eating birds known to be much less numerous than formerly, probably as a consequence of human action on habitat, include all bluebirds, nighthawk, Nuttall's poorwill and Lewis's woodpecker. Raptorial birds in this status include spotted owl, burrowing owl (in British Columbia), Richardson's merlin, prairie falcon and peregrine falcon. Some species have increased their range and numbers, for example the tufted titmouse, house finch, black-headed grosbeak, killdeer, American robin, barn swallow, brown-headed cowbird, turkey vulture, cardinal, all blackbirds and barred owl (in the West).

Drainage or infilling of ponds and wet lands in areas useful for agriculture has reduced the populations of many species using these habitats. Farther north, an important force has been the increasing numbers of outboard motors and the penetration of people into hitherto remote lakes. Together these events have led to a reduction in the available habitat for lake and pond nesting species and increased disturbance on remaining nesting lakes. The white pelican, greater sandhill crane, western grebe and common loon have all decreased probably under the effect of these forces.

The marine birds on the Pacific and Arctic coasts remain substantially unaltered in total populations. On the Atlantic coast, in recent years, numbers of marine birds are markedly below those before the period of human exploitation of the 18th and 19th centuries. Where small boat visitation to nesting colonies during the summer months is prevalent, as in the Strait of Georgia, the cormorant colonies now raise few young but the overall consequence is not known. Cormorants have decreased on the Great Lakes, probably as a consequence of pesticides. Glaucous winged, herring and black-backed gulls have increased, likely as a result of winter food supplement from urban garbage sources.

Some grouse populations have changed substantially since 1956. The greater prairie chicken has followed its habitat into virtual extinction; the sharptailed grouse is greatly reduced, particularly in British Columbia where overgrazing and overkill have combined to almost eliminate the species. California quail have vanished from much of its former introduced range. The sooty grouse, on

the other hand, has increased as deforestation on Vancouver Island has expanded available range. The dusky grouse has decreased.

Waterfowl fluctuate so widely from year to year in response to the abundance of water on the nesting grounds that it is difficult to be sure of long term trends in numbers. In general, most populations of Canada geese have increased, mainly as a result of good management and new introductions. Lesser snow geese have increased. The trumpeter swan went through a period of recovery from greatly reduced numbers but seems to have reached a plateau. Greater snow geese and Ross's geese are more numerous now than at any time since the twenties, aided by severe restrictions in hunting and by habitat improvement on migration and wintering areas. Brant have declined on the Atlantic and Pacific coasts, probably as a consequence of disturbance and alterations of the wintering grounds.

Fur bearers and large carnivores

The trapping of fur bearing mammals in Canada for two centuries has had little noticeable influence on the numbers of most species. Beaver were greatly reduced throughout the country by the early years of this century but good management since the forties has restored the species to most of its former range and apparent numbers. Wolves and coyotes have increased in much of western Canada since about 1960 as a consequence of a change in policy with respect to the use of poisoning campaigns. However, heavy trapping has brought about local declines in numbers. The wolverine, probably the rarest species of fur bearer regularly trapped in Canada, has been eliminated from many parts of its original range. Badger appear to have decreased except in Manitoba but there are no dependable data. Kit fox and blackfooted ferret are very scarce or extinct.

The large carnivores have decreased and lost much of their former range. To some extent this was the inevitable consequence of their impact on livestock raising. Cougar and grizzly bear are extremely scarce in their former ranges, except in the mountainous far west. Grizzly have been reduced in numbers even in the southern mountain ranges of British Columbia and wherever livestock is driven to alpine ranges for summer grazing. Black bears have increased as deforestation, land clearing and cultivation of food crops improved food supplies.

Ungulates

White-tailed deer have shown a dramatic increase in numbers in some parts of Canada but have decreased in Québec, Ontario and Saskatchewan. The species has extended its range north and west since the forties. Black-tailed deer are less numerous than

formerly, largely as a result of overhunting and reduction in winter range areas. In the twenties, the moose began to increase and in Western Canada to extend its range southward out of the boreal forest zone. The increase took it south as far as the 49th parallel through a forest area where moose were previously unknown. The food reserves of the new range facilitated abnormal population densities. It has maintained its new range but has declined in numbers. In some places this has resulted from overkill, but generally numbers fell as food supply decreased.

The eastern race of the American elk is extinct. Elk experienced a crash to the verge of disappearance in all parts of western Canada in the late 1800's as a result of some very severe winters. They increased to a high point about 1950 but even then did not reoccupy much of their former range. Recently elk have declined and they are now just a small fraction of their original numbers.

Caribou continue to decline and to contract their range south of the Subarctic. Québec appears to be an exception, with increasing numbers reported. In the Northwest Territories and the Yukon, the herds appear to have increased since 1956 but are not up to the numbers of the 1920-1930 period. An exception to the general increase of the arctic herds seems to be the *Peary caribou* of the Queen Elizabeth Islands which is now at about one-tenth of its numbers in 1966. This decline was apparently weather induced. The *Queen Charlotte Island caribou* is extinct.

Human impact does not appear to have altered the populations of Rocky Mountain bighorm or Dall's sheep since 1950. The California bighorm is less abundant than in 1870 but slightly more so than in 1951. Though accurate counts are lacking, the general impression is that Stone's sheep are less numerous and may still be declining. Increased accessibility to hunting appears to be involved.

Mountain goat populations have suffered overkill and are reduced in numbers wherever they have been accessible to hunters. This species presents a special management problem.

The wood bison has been in serious trouble. The species has suffered from genetic swamping and introduced diseases arising from an ill-advised transplant of plains bison into its range in the 1920's. Progress is being made in establishing a pure strain on an isolated range in the Northwest Territories as well as in Elk Island National Park where it can increase without contact with contaminated stocks. Introductions from these nuclei into areas of former range are planned.

The muskox has increased over the last century and now seems to be experiencing natural balancing forces including local starvation and weather disasters. Human impact has been closely managed.

Pronghorm are decreasing due to agricultural expansion in combination with severe winter weather.

Marine mammals

Eleven species of seals occur in Canadian waters, eight as residents, three as post-breeding visitors. Of the latter, the elephant seal and the California sea lion have increased in numbers and extended their use of the Pacific coast of Canada. Increase of the elephant seal is part of the continuing slow recovery from the edge of extinction reached during the end of the days of commercial sealing. The Alaskan fur seal has declined. apparently from natural causes. Numbers of the ringed seal and bearded seal of the Arctic are unchanged, the former probably the most numerous species in Canada. Walrus may have decreased. Hair seal are probably now near original numbers along the Pacific coast but are greatly reduced on the Atlantic coast and in the eastern Arctic. In the Atlantic, grey seal are more abundant than in 1951. The numbers of the hooded seal are believed to be unchanged for many years. Harp seal numbers are less than half what they were in 1951 and there is little doubt that overkill has brought about the reduction. There is difference of opinion on the continuing impact of sealing on the species. The preponderance of evidence is for a declining population though the stock is still large and good management could reverse the trend. The Steller's sea lion of the Pacific is static or increasing slowly following years of persecution. It is still far from its former numbers. It breeds now in only two major colonies and is difficult to protect from illegal killing by fishermen.

Canada no longer hunts whales except for a small Inuit kill of beluga and narwhal and an occasional bowhead. All the large whales, except the bowhead and California grey whale, that enter Canadian waters have decreased as world wide populations were decimated by overkilling. All species probably still occur though the Pacific right whale is so scarce, despite 40 years of total protection, that its survival is a matter of doubt. The bowhead has increased slowly over about 90 years of protection following upon virtual extinction by European whalers in the late 1800's. The grey whale has made a remarkable comeback and is now a regular summer visitor off Vancouver Island. Fewer killer whales are seen now than in the years between 1930 and 1950 but the significance of this is not known. The status of the small whales, porpoises and dolphins appears to be relatively stable. There is no demonstrable impact by man on them in Canadian waters.

Endangered species

In all parts of Canada there are species of animals that exist in such small numbers that their continued survival is doubtful or will require special conservation measures. In compiling this list, published references and the assistance of colleagues who have special knowledge of some groups of animals have been used. The study is concerned with endangerment in Canada as a whole, not within the boundaries of the individual provinces although this is important as indications of declining range. A number of the species now very rare in Canada are at the northern extremity of the species' range and are still numerous in adjacent parts of the United States; others share a general continent-wide decline.

There is a concentration of endangered species in southern Ontario consisting primarily of reptiles and amphibians unique to the area and of fishes formerly abundant in the Great Lakes and now in danger of extinction as a consequence of man-induced changes in those water bodies. These include over-fishing, pollution-induced changes in water quality and the introduction of the predatory sea lamprey. Along with species regarded as endangered are included generally recognized sub-species.

It is customary to use different categories to identify animals that are in different stages of increasing vulnerability to extinction. Even though such categories are to a degree arbitrary, they have been found useful in drawing attention to the status and trends in animal populations that, for one reason or another, are failing to maintain themselves.

Endangered: in immediate danger of extinction and unlikely to survive without the implementation of special protective or restorative measures.

Depleted:still present in numbers adequate for survival but heavily depleted and continuing to decline.

Rare:not under immediate threat of extinction but present in such small numbers or in such a restricted or specialized habitat that the species could quickly disappear.

Because the limits of each of these categories are hard to define, specialists will disagree on the placement of one species or another in its appropriate category. All agree, however, that each species and subspecies named below is present in small numbers and is vulnerable to the impact of our activities in altering land and its plant assemblage, introducing new chemical or physical hazards or killing them directly.

In preparing this list*, help was provided by our colleagues in the Canadian Wildlife Service, the National Museum of Natural Science, the Royal Ontario Museum, the Department of Zoology of

^{*} The subspecies designations have been used only where more than one subspecies of the species occur in Canada and not all of them are rare or endangered.

the University of Toronto, and others. The treatment presented is the responsibility of the author.

The following Canadian animals are regarded as endangered:

Mammals:

Vancouver Island water shrew
Newfoundland marten
Queen Charlotte Island weasel
Vancouver Island wolverine
Vancouver Island marmot

Sorex palustris brooksii Martes americana atrata Mustela erminea haidarum Gulo gulo vancouverensis Marmota vancouverensis

Birds:

whooping crane
eskimo curlew
Aleutian Canada goose
peregrine falcon
spotted owl

Grus americana Numenius borealis Branta canadensis leucopareia Falco peregrinus Strix occidentalis

Of these the goose occurs only as a migrant, and the curlew may be extinct.

Reptiles:

pigmy horned lizard Lake Erie water snake blue racer sharp-tailed snake northwest pond turtle Phrynosoma douglassi Natrix sipedon insularum Coluber constrictor foxi Contia tenuis Clemmys marmorata

Amphibia:

Blanchard's cricket frog small mouthed salamander Pacific giant salamander eastern tiger salamander Acris crepitans blanchardi Ambystoma texanum Dicamptodon ensatus Ambystoma tigrinum tigrinum

Fresh-water fishes:

Atlantic whitefish long-jaw cisco

Coregonus canadensis Coregonus alpenae black redhorse
gravel chub
silver chub
brindled madtom
Nooksack long-nose dace
blue-back herring
pugnose minnow
Banff long-nosed dace
shorthead sculpin

Moxostoma duquesni
Hypobopsis x-punctata
Hypobopsis storeria
Notorus miurus
Rhinichthys cataractae ssp.
Alosa aestivalis
Notropis emilae
Rhinichthys cataractae smithi
Cottus confusus

Mollusca:

Gatineau tadpole snail tan-blossom pearly mussel Whiteaves giant ramshorn

Banff-springs physa

Physa gyrina latchfordi Dysnomia torulosa rangiana Helisoma corpulentum whiteavesi Physa johnsoni

Rare or depleted species not yet endangered:

As well as the 30 species of vertebrates that are in danger of extinction, there are a number of others that are very local in distribution or exist in numbers so small that they merit special attention even though they are not at this time endangered.

Depleted Species:

Mammals:

white-tailed jackrabbit
mountain beaver
black-tailed prairie dog
Sitka white-footed mouse
grizzly bear (some populations)
wolverine
eastern cougar
right whale
blue whale
humpback whale
Roosevelt's elk
wood bison
California bighorn

Lepus townsendii
Aplodontia rufa
Cynomys ludovicianus
Peromyscus sitkensis
Ursus arctos
Gulo gulo
Felis concolor cougar
Balaena glacialis
Balaenoptera (Sibbaldus) musculus
Megaptera novaeangliae
Cervus canadensis roosevelti
Bison bison athabascae
Ovis canadensis californiana

Birds:

North Atlantic gannet Cooper's hawk ferruginous hawk prairie falcon osprey greater sandhill crane Morus bassanus Accipiter cooperii Buteo regalis Falco mexicanus Pandion haliaetus Grus canadensis tabida upland plover long-billed curlew sage thrasher yellow-breasted chat

Bartramia longicauda Numenius americanus Oreoscoptes montanus Icteria virens

Reptiles:

Queen snake
Butler's garter snake
Pacific gopher snake
eastern spiny soft-shell turtle

Regina septemvittata Thamnophis butleri Pituophis melanoleucus catenifer Trionyx spiniferus

Amphibia:

Jefferson's salamander silvery salamander

Ambystoma jeffersonianum Ambystoma platineum

Fishes:

blackfin cisco kiyi deepwater cisco copper redhorse river redhorse western silvery minnow cutlips minnow pugnose shiner bigmouth shiner greenside darter spotted sucker speckled dace redside dace shortnose sturgeon shortnose cisco Opeongo whitefish stone roller Campbell's sucker silver shiner blackstripe topminnow Y-prickleback giant stickleback

Coregonus nigripinnis Coregonus kiyi Coregonus johannae Moxostoma hubbsi Moxostoma carinatum Hypognathus n. nuchalis Exoglossum maxilingua Notropis anogenus Notropis dorsalis Etheostoma blennoides Minytrema melanops Rhinichthys osculus Clinostomus elongatus Acipenser brevirostrum Coregonus reighardi Coregonus clupeaformis ssp. Campostoma anomalum Catostomus sp. Notropis photogenis Fundulus notatus Allolumpennus. hypochromis Gasterosteus sp.

Mollusca:

yellow lamp-mussel imbecile mussel mud puppy mussel bean villosa blunt albino physa dwarf wedge mussel Lampsilis cariosa
Anodonta imbecilis
Simpsoniconcha ambigua
Villosa fabalis
Physa jennessi athearni
Alasmidonta heterodon

Rare species:

Mammals:

Virginia opossum Bendire's shrew Gaspé shrew least shrew eastern mole Townsend's mole fringed bat small-footed bat eastern cottontail harvest mouse woodland vole sagebrush vole Ord's kangaroo rat plains pocket gopher grey whale finback whale northern elephant seal grey fox

Didelphis virginiana Sorex bendirii Sorex gaspensis Cryptotis parva Scalopus aquaticus Scapanus townsendii Myotis thysanodes Myotis leibii melanorhinus Sylvilagus floridanus Reithrodontomys megalotis Microtus pinetorum Lagurus curtatus Dipodomys ordii Geomys bursarius Eschrichtius robustus Balaenoptera physalus Mirounga angustirostris Urocyon cinereoargentatus

Birds:

trumpeter swan * Ross's goose *+ piping plover red knot buff-breasted sandpiper * Hudsonian godwit* long-billed dowitcher + stilt sandpiper * laughing gull ivory gull ' roseate tern razorbill ' barn ow1 + flammulated owl T Nuttall's poor-will black-chinned hummingbird + red-bellied woodpecker + white-headed woodpecker + Acadian flycatcher tufted titmouse

Cygnus buccinator Chen rossii Charadrius melodus Calidris canutus Tryngites subruficollis Limosa haemastica Limnodromus scolopaceus Micropalama himantopus Larus atricilla Pagophila eburnea Sterna dougallii Alca torda Tyto alba Otus flammeolus Phalaenoptilus nuttallii Archilocus alexandri Centurus carolinus Dendrocopos albolarvatus Empidonax virescens Parus bicolor

grey-headed chickadee Carolina wren canyon wren mockingbird wheatear blue-grey gnatcatcher yellow wagtail yellow-throated vireo Connecticut warbler * prothonotary warbler blue-winged warbler Louisiana waterthrush hooded warbler orchard oriole dickcissel lark bunting Henslow's sparrow lark sparrow McCown's longspur

Reptiles:

Prairie skink eastern hognose snake western hognose snake eastern yellow-bellied racer

eastern fox snake black rat snake

Amphibia:

northern spring salamander Fowler's toad

Mollusca:

olive hickory nut fat mucket

Qu'Appelle ramshorn Campeloma spire snail

Parus cinctus Thryothorus ludivicianus Catherpes mexicanus Mimus polyglottos Oenanthe oenanthe Polioptila caerulea Motacilla flava Vireo flavifrons Oporornis agilis Protonotaria citrea Vermivora pinus Seiurus motacilla Wilsonia citrina Icterus spurius Spiza americana Calamospiza melanocorys Passerherbulus henslowii Chondestes grammacus Rhynchophanes mccownii

Eumeces septentrionalis
Heterodon platyrhinos
Heterodon nasicus
Coluber constrictor flaviventris
Elaphe vulpina gloydi
Elaphe obsoleta

Gyrinophilus porphyriticus Bufo woodhousei fowleri

Obovaria olivaria Lampsilis radiata siliquoidea morph borealis Helisoma pilsbryi nssp. Cincinnatia cincinnatiensis

Endangered species legislation.

The protection of many rare and endangered species in Canada is not as well served by existing legislation or by programs in place as it could be. Jurisdictions are divided between the provinces and the Government of Canada, but responsibilities are not well defined. Clause 9 of the Canada Wildlife Act, 1973 empowers the federal Minister of the Environment to cooperate with one or more provinces to take measures needed to protect any species in danger of extinction. Where its mandate has been clear as, for example, in the cases of the trumpeter swan, prairie and peregrine falcons, whooping crane, wood bison and muskox, the Government of Canada has taken or is attempting effective response. Clause 13 of the Act empowers the Governor General in Council to specify the measures to be taken to protect any species in danger of extinction. This authority has seldom been invoked.

New Brunswick and Ontario have legislation providing for the special measures needed to protect endangered species and to rebuild their populations. These acts empower the Ministers to take action. The effect might be strengthened if responsibility were assigned.

In our opinion it would be advantageous to accomplishing the purposes of conservation of endangered species if the federal Minister of the Environment were clearly assigned the responsibility, in cooperation with the Provinces as required, to initiate the programs needed to provide for the survival of species of Canadian fauna threatened with extinction. It would be helpful also if the Minister of the Environment had the responsibility to maintain a continuing review of the status of all species of Canadian Wildlife so as to detect if any additional species were approaching a state of endangerment.

^{#*} Bird species marked with an asterisk breed entirely or largely in Canada. Those marked with * have a main range partly or largely outside of Canada and are scarce throughout. The remaining species in this list of birds, although of limited range and scarce in Canada, have an extensive distribution outside the country where they are not rare.

THE STATE OF THE WATER ENVIRONMENT IN CANADA - 1976 Irving K. Fox and J.P. Nowlan

Compared with many nations, Canada is blessed with a supply of fresh water adequate in most regions for domestic, agricultural and industrial purposes. With local exceptions, the natural quality of this water is suitable for human consumption and the maintenance of healthy fish populations. Wetlands support an abundance of wildlife while lakes and streams enhance the wide variety of Canadian landscapes. Nevertheless, Canada cannot afford to be profligate. Despite this manifest abundance, the health and wellbeing of Canadians and the maintenance of our economy are critically dependent on the conservation and quality of these water resources.

This overview endeavours to highlight the major problems we face in our efforts to manage the nation's water environment with wisdom and foresight.

WATER QUALITY

Bacterial pollution

Historically, concern about pollution stemmed from the bacterial contamination of water supplies and the consequent danger to public health. This kind of pollution continues to be an important problem in certain parts of Canada. In Québec, 90 percent of the domestic wastes are discharged without treatment and consequently swimming in major streams is prohibited almost everywhere in the St. Lawrence Valley. In the Maritimes, Halifax-Dartmouth, Moncton and St. John's discharge effluents to the sea without treatment Generally speaking, the Prairie Provinces and British Columbia practice a higher level of treatment than the eastern provinces. It is reported that in Alberta all sewered communities have the equivalent of secondary treatment while in Saskatchewan all communities have primary treatment and more than 90 percent have the equivalent of secondary treatment. In Manitoba, 85 percent of settlements with populations of more than 200 are sewered and have some form of treatment². British Columbia is moving rapidly toward secondary treatment of all municipal sewage. Until 1976, several municipalities in the Greater Vancouver Region discharged untreated sewage to the Fraser River; these discharges are now being treated at a central plant.

One consequence of bacterial pollution in coastal areas is the contamination of shellfish. Along the Atlantic coast, 211 areas and 1800 km² have been closed to shellfish harvesting for this reason. While these problems are not so extensive along the west coast, Cowichan Bay, Ganges Harbour and Swartz Bay, as well as areas in the vicinity of Vancouver, Ladysmith and Crofton, have been closed to harvesting³.

The percentage of urban areas which treat municipal sewage is increasing and the levels of treatment are rising. For example, the bacterial quality of fresh waters along the north shore of Lake Ontario have been improving steadily in recent years. It must be recognized, however, that sewage treatment of municipal wastes will not completely eliminate the bacterial pollution of water resources. Substantial runoff from urban areas and agricultural land contains bacterial contaminants. Bacterial pollution remains a problem in the Toronto area, while in the lower Fraser River the prospects are that levels will continue to exceed standards for water contact sports even though almost all municipal sewage in the lower Fraser Valley is now treated and the effluent disinfected.

Toxic wastes

The most serious threat to human health and other forms of life appears to come from the increasingly pervasive use of toxic materials. In general these can be divided into two categories: toxic materials that occur naturally in the environment, but which may be appreciably augmented by man's activities either locally or globally, and those materials which are products of chemical laboratories and which are employed either because of their toxic qualities (pesticides, fungicides, etc.) or utilized in industrial processes where toxicity is merely an incidental quality. Combinations of these two types, largely as organo-metallic compounds, can present serious hazards to the human environment. It is reported that 360 organic chemicals have been found in treated drinking water in the United States; of these, 50 have been tested and 18 found to be carcinogenic.

Dramatic cases of toxic pollution, e.g., arsenic from mining operations and mercury resulting from mining and industrial processes, have been in the newspaper headlines for several years. Mercury exceeds desirable limits (0.2 mg/l) at a number of locations in the Maritime Provinces as well as in some waters of northern Ontario and northern Québec. The more serious long range problems arise from the widespread and insidious dissemination of trace metals and chemical compounds. These reach water bodies in various ways - from the effluent of an isolated mine or industrial plant, from the use of pesticides and other chemicals in agricultural and forestry operations, from the fallout of airborne wastes, and from households, commercial establishments, transportation facilities and the industries of urban agglomerations.

Pollution from mining activity is of concern wherever mining is carried out in the country and the plans for increased coal mining

in Alberta and British Columbia suggest that pollution from this source could become increasingly serious in these areas. It is difficult to generalize concerning the environmental hazards of the use of pesticides in agricultural practice. Though there is evidence that DDT is declining in the waters of Lake Erie and Lake Ontario, studies in the lower Fraser Valley do not reveal significant quantities of pesticides in the water courses that drain agricultural lands. On the other hand, there is some evidence in the Prairie Provinces of slightly greater concentrations of herbicides such as 2-4-D. Airborne wastes are a growing cause for concern in several regions. Fallout of sulfur dioxide in northern Ontario is causing appreciable acidification of lakes and streams. development of low grade coal for thermal power generation at Hat Creek in British Columbia may threaten downwind water bodies with acidification. Atmospheric contributions to water systems of contaminants such as lead and PCBs, and of nutrients such as phosphorus, are dominant features of the chemical budgets of many Canadian water bodies, including the upper Great Lakes.

The most serious and intractable problems of toxic pollution of fresh waters are associated with urban areas throughout Canada. The pathways taken by these materials include the following:

- 1. Discharge from sewers and treatment plants. Toxic materials are widely used by households, commercial establishments, universities, hospitals, research institutions and industries. Though some take special precautions, most dispose of toxicants via the municipal sewers where conventional treatment facilities remove only a part of the toxic material and the remainder is discharged in the effluent.
- 2. Direct discharge by industries which use large quantities of water. Many industrial processes utilize toxic substances of some type and usually some portion of these end up in the industrial effluent.
- 3. Runoff from streets and urban land. Normal surface runoff carries away toxic pollutants from urbanized land. Home owners use pesticides in their gardens, ingredients of emissions from automobiles and other vehicles are washed into streams and sewers by rainfall, and chemical compounds such as PCBs accumulated on streets, in land fills and solid waste disposal sites end up in surficial water bodies or are leached to underground aquifers.

Studies of toxic materials in the lower Fraser River near Vancouver are indicative of the effects of an urban-industrial area upon its associated water environment.

- . Trace metal accumulation in shellfish taken from Sturgeon Bank near the mouth of the Fraser River was abnormally high. Older crabs contained approximately ten times as much mercury as crabs of the same age taken from control areas.
- . For two species of fish that reside in the lower Fraser River, average mercury concentrations exceed the accepted level in Canadian food.
- . Much higher levels of chlorinated hydrocarbons were found in the sediments of a tributary flowing through Metropolitan Vancouver than in tributaries that drain agricultural and forested lands.

These findings are significant considering the large flow volume of the Fraser River and that Metropolitan Vancouver does not have an industrial complex associated with the discharge of large quantities of toxic pollutants.

For several reasons, it is particularly difficult to deal with this kind of toxic contaminant. First, we are unaware of the precise effects of many of these pollutants. For some, the acutely toxic dosages to organisms have been determined but the effects of small dosages over long periods are generally unknown. For many of the newer compounds, very little is known about the effects on organisms at almost any level. Second, the sources of many toxic chemicals are diverse and often difficult to identify and isolate. Third, treatment of such wastes at centralized treatment plants is usually unsatisfactory because a substantial portion reach streams by pathways other than sanitary sewers, because strong concentrations of some toxics impair the capability of a treatment system to handle organic wastes, and because centralized removal procedures are very costly.

Salinity

The use of salt and calcium chloride on highways and city streets is increasing the salinity of naturally fresh waters. For example, Harvey reports that "some small lakes in Newfoundland show total dissolved solids raised from 50 ppm in summer to 200 ppm in winter. The sodium chloride content of the Lower Great Lakes has more than doubled in the last few decades, and this must be attributed in part

to the use of road salt"⁵. Data are not available on conditions elsewhere in the country.

Organic wastes

An important function of a conventional sewage treatment plant is to remove organic matter because the process of decay of this material in a water body makes strong demands on the available oxygen in the water. If the waste loading is sufficiently large, dissolved oxygen can be completely depleted. Since aquatic life requires oxygen, a reduction in oxygen levels will impair or kill off fish and other forms of life.

In Canada, the major sources of organic wastes are domestic sewage and the pulp and paper industry. Wherever domestic sewage is discharged untreated, there is a risk that dissolved oxygen will be reduced to damaging levels. The St. Lawrence River is sufficiently large that despite a heavy loading of untreated municipal sewage, oxygen levels remain relatively high. No major instances of serious oxygen depletion by municipal wastes have been reported. On the other hand, wastes from pulp and paper mills are of concern at several locations. These mills not only discharge chemicals and suspended materials, themselves a cause for apprehension, but the organic waste loads are very large indeed. In Québec, the pulp and paper industry imposes a biochemical oxygen demand upon the water resources of that province equal to that from the untreated sewage discharge of 17 million people. In New Brunswick, the industry poses a notable problem on the Saint John River; the position is similar in parts of Ontario and British Columbia. Data are not available to indicate the extent to which discharges from the pulp and paper industry have changed since treatment standards were prescribed by the federal government.

Eutrophication

Nutrient enrichment resulting in eutrophication is a water quality problem of importance in many parts of Canada. Where eutrophication is advanced, dissolved oxygen levels may be depleted at certain times of the year and the water body may have an unpleasant odour, be esthetically unattractive, and in extreme cases the water can become poisonous.

In the Prairie Provinces south of the Canadian Shield, eutrophication of lakes constitutes a serious water quality problem. Because of the nutrient-rich soils of this region, many lakes are naturally eutrophic. The heavy use of agricultural fertilizers together with sewage

discharges have tended to enrich these water supplies even further, and therefore lakes in this region may be several times as eutrophic as any of the Great Lakes.

Wherever the shoreline of a lake is heavily developed and specific provision has not been made to divert nutrient discharges away from the lake, eutrophication is a threat to water quality. This problem is faced in many of the lakes of Ontario and Québec and is of growing concern in the Thompson River and Okanagan drainage basins of British Columbia.

Beginning in 1970, the use of phosphates in detergents was reduced by federal regulation, with a further reduction instituted in 1973. Phosphorus is one of the most important elements that stimulate eutrophication. Recent trend analyses by the Inland Waters Directorate suggest that phosphorus levels in Canadian rivers may be diminishing and that this decrease is largely attributable to the reduced use of phosphates in detergents.

WATER QUALITY MANAGEMENT

The problem

While data are not available on which to base a detailed assessment of water quality conditions in all regions of Canada, this overview indicates some of the major aspects of the task facing the nation in managing water quality effectively.

It is important to recognize that the nature of contamination problems varies greatly according to geographical location. Remedial action must be designed in the light of climatic, hydrologic, geologic and biological conditions characterizing a particular water environment, as well as the volume and nature of waste loadings being inflicted on that environment. National policies and programs which aim to foster the preservation and enhancement of water quality must take into account the location-specific nature of pollution problems.

It is also essential to understand that the scientific bases are very thin for estimating the consequences of many contaminants and for controlling them effectively. This is particularly true for the multitude of toxic materials now entering our water bodies. While much more research in the field of pollution control is needed, management efforts must proceed for many years in the face of considerable uncertainty. This leads to the urgent need to develop, for each region, water quality management plans geared to research programs, plans which take into account the present desperate lack of knowledge, and associated research programs aimed directly at reducing

the most serious uncertainties that managers face.

Furthermore, policy-makers must be cognizant of the urgency to initiate a much more systematic and effective approach to water quality management in this country. On the east and west coasts, on the Great Lakes, and on many other lakes and rivers, valuable fishery resources are threatened by contamination. It is difficult to appraise the extent to which continued pollution of the lower Fraser River will affect the invaluable salmon runs. The apparently inexorable flow of a wide range of chemicals into the nation's water bodies is of even greater concern, in view of our woeful lack of scientific understanding of the long term consequences on the aquatic ecosystems and on the human populations dependent on these water supplies.

Floods

Since early man recognized the locational advantages of settlement along rivers and on flood plains, he has been forced to adapt to flood conditions. The average river overflows its banks about once in every two years. From time to time this overflow will be very large. Even the Fraser River, a relatively stable stream, experiences flood flows six to seven times the average, and some rivers have had flood flows in excess of thirty times the average. Though flood problems in Canada have not been great compared with those faced by many other countries, nevertheless in every region of this country floods continue to pose serious problems.

Among the most serious and difficult flood hazards encountered in Canada are those created by the periodic high levels of the Great Lakes. It has been estimated that in 1972 and 1973, damages from flooding and associated erosion along the Canadian shores of Lake Ontario and Lake Erie amounted to \$19 million, including a complete loss of land valued at \$9 million. Some 3000 km of the Canadian Great Lakes shoreline are undergoing significant erosion. There appears to be no simple structural solution to this situation.

Flood problems elsewhere are not insignificant as the following highlights indicate:

- . In New Brunswick, flooding of the Saint John River caused damages estimated at \$12 million in 1973.
- . In Québec, 40 to 50 municipalities periodically suffer from floods. Since 1969, data has been systematically collected and estimates of damage range from \$1.75 million in 1969 to \$25 million in 1974.

- . Some major urban centres located along streams in Ontario have periodically experienced serious floods. The results of a hurricane in 1954 caused \$25 million in damages.
- Some 2400 homes in Calgary are vulnerable to flooding with a probability of occurence every 70 years.
- . In British Columbia, four major centres in the Fraser Valley and twelve settlements elsewhere are subject to flooding.

Control works constructed in recent years have reduced the flood hazard in many parts of the country. In the Winnipeg area, protection works have prevented damages measured in hundreds of millions of dollars. A major flood control program is underway in the lower Fraser Valley. Nevertheless, the benefits of structural projects to reduce flood damage are being partially offset by increased occupation of flood plains. In some cases, provincial and local governments are endeavouring to regulate the use of flood-prone lands. The federal flood damage reduction program is designed to reinforce and complement provincial attempts to inhibit future developments in hazard areas.

Droughts

The major exceptions to ample or adequate water supply in Canada are the Okanagan Valley in British Columbia and parts of the Prairie Provinces.

Cultivated agriculture in the Okanagan depends on irrigation, and more water could be utilized than is naturally available in the region. The import of additional water by diversion projects has been contemplated but the federal/provincial Okanagan Valley study concluded that the region should adapt its economic base to the available supply. It is recognized that deforestation of the upper levels of the drainage basin may complicate the situation by reducing the summer flow of streams used for irrigation.

The prairies experience wide annual variations in precipitation and consequent stream flow. To adapt to these variations, irrigation is traditional and is being practiced to an increasing extent. In Alberta, there has been a steady growth of irrigation at an increment of 4000 to 6000 hectares per year. With increasing irrigation, the entire flow of many streams in the Prairie Provinces may be appropriated for extraction, thus aggravating the vulnerability to droughts.

Elsewhere, communities and agricultural areas in Canada experience periodic droughts and shortages. Municipal and industrial water supply shortages that arise can generally be attributed to failures to sufficiently develop available supplies. The practicability of irrigation in these areas can only be determined by comparing the benefits that irrigation would provide against the costs of such measures, including the economic costs of storing and distribution, and any adverse environmental effects, such as the impairment of quality and the destruction of wildlife habitat. If the irrigation is of a flow-through type, there arise problems of disposal of return waste water without imposing unacceptable contamination of the water passed on to downstream users. This is the most important aspect of Canadian objections to the Garrison diversion project in the United States.

Structural impacts on the water environment

History records man's efforts to increase the benefits of water resources by building dams and dykes, deepening channels or constructing canals. Substantial insults to the environment are often associated with these developments. In Canada, structures that modify the water environment have been built since the early days of European settlement and the prospects are that this development will continue.

Structural developments may have two major types of effects on the water environments. Through drainage and dyking, the area covered by water, all or part of the time, is reduced, and what was a natural aquatic or semi-aquatic ecosystem is changed to a terrestrial ecosystem. Dams, reservoirs, and the dredging or dyking of stream channels profoundly modify the hydrologic regime which alters in turn the nature of the water ecosystems. Dams and reservoirs inundate extensive tracts of originally dry land.

Reduction in area of wetlands

By 1920, about 80 percent of the salt marshes of the Maritimes had been reclaimed. In the lower Fraser Valley, many thousands of hectares of wetlands have been drained and dyked, drastically reducing the habitat available for waterfowl and some species of salmon. In the Prairie Provinces, which produce 87 percent of the waterfowl in North America, wetland drainage threatens to have serious consequences. Throughout the country there are continuing pressures to reclaim even more of Canada's remaining wetlands. In some instances, the loss of habitat can be particularly serious for certain avifauna. For example, on the North Shore of the St. Lawrence River east of Québec, plans to reclaim 650 hectares of wetland could have grave consequences for the population of snow geese that converge on these grounds in the spring and fall.

Changes in water regimes

Canada has invested heavily in the development of water resources for electric power generation. In British Columbia, 78 percent of the electric power capacity is provided by hydro facilities and in every other province except Prince Edward Island, water supplies a major part of the electric power demand. These developments have often had, at best, questionable environmental effects. For example, flow regulation modified the ecology of the Cumberland Delta, necessitating a multi-million dollar remedial program. The Bennett Dam on the Peace River adversely affected the Peace-Athabasca Delta, requiring a three million dollar program to rehabilitate the area. Frequently, good agricultural land, productive wildlife habitat or a scenic valley is unundated by a fluctuating reservoir of questionable environmental value. Nevertheless, it should be emphasized that the power resources and flood control these structures provide are of marked economic importance, and at times the reservoirs themselves have had positive environmental effects. For example, the Carrillon Dam on the Ottawa River, constructed in 1962-1963, improved wildlife habitat, and an empoundment on the Grand River in Ontario restored Luther Marsh which had been previously drained.

It is apparent that developments under consideration will continue to significantly modify the water environment through the construction of control structures. Across the country, energy demands are causing further hydro electric power developments to be examined. Tidal power is being considered for the Bay of Fundy which is likely to have profound effects upon the salt/fresh water interface, upon the ecology of wetlands and upon the incidence of flooding. The still untapped hydro potential of Labrador, northern Québec and northern Ontario are beckoning power developers. Further developments are contemplated on the Saskatchewan River and the Athabasca River. British Columbia is actively considering its remaining hydro electric power potentials along with thermal power from coal.

Other developments are also possible. The provision of facilities to extend the navigation season on the Great Lakes - St. Lawrence system could increase erosion and flood damage. On the Fraser River, facilities to deepen and maintain the navigation channel near its mouth have been planned.

There is no simple formula for responding to the environmental effects that structural developments perpetuate on the water environment. Although the serious environmental consequences that have resulted from many structural impacts are deplorable, it would be mindless to oppose all water resources structures. But the developments in prospect pose two important questions.

First, are we proceeding with the research and investigations necessary to estimate the environmental effects of large structures so that the impacts can be weighed when decisions are made? We fear that Canadians may be initiating development programs costing billions of dollars which will bring about enormous environmental changes without having an appreciation of what these changes will be or the cost of remedial measures. As an example, the flow regime of the Saskatchewan River has been modified so that timing of high and low flow periods is reversed through regulation of river flows. No one knows what the environmental effects of such a drastic change will be.

Second, do we have procedures which ensure that the environmental effects of structures are taken into account when decisions are made? Does our planning of water development facilities include strategies for dealing with the uncertainties associated with many water management decisions? We seriously question whether investments in research are adequate, considering the immense cost of water development structures and the significance of their potential environmental impacts, including those on other resources and on other human uses for the water. We are concerned that far reaching irreversible decisions may be made while lacking the ability to predict the consequences with reasonable accuracy and without an examination of a full range of alternatives for proceeding with minimal risks to the environment.

Boundary waters

Much of the water on which Canadians depend is shared with the United States. Thus the character of the water environment that affects about two thirds of the Canadian population may be determined in large measure by actions taken by another country. The Boundary Waters Treaty of 1909 provides the basic framework for international cooperation in the management of these resources, and this framework has been supplemented by additional treaties and agreements, such as the treaty dealing with water quality in the Great Lakes.

Viewed in the perspective of what is being done in other parts of the world, the record of cooperation by Canada and the United States is exemplary. Yet, we cannot be unmindful of the fact that water quality in some parts of the Great Lakes had deteriorated seriously before the Great Lakes Treaty was negotiated, and implementation of the treaty has not een as rapid as intended. In addition new problems continue to a ise, illustrated by the threat to water quality in Manitoba posed has the Garrison Project in the United States.

This experience demonstrates the importance that Canada must continue to attach to the me agement of boundary waters. Canada must be alert to potential develor ments in the United States that can adversely

affect water use by Canadians, and in turn Canada has a responsibility to manage its activities so that water use by Americans is not adversely affected. This demands a continuing healthy spirit of cooperation on the part of both countries; it also means that Canada must be willing to devote sufficient manpower and other resources to understand how boundary waters should be managed to best serve the interests of the Canadian people.

CONCLUSION

It is obvious that it is not practicable at this time to present a comprehensive overview of the state of the water environment in Canada. The data are spotty and incomplete. An important requirement is to collect data systematically to permit a periodic general survey of the water environment, to maintain public awareness and to provide governments with a rational basis for deciding on priorities for future programs. Despite the inadequacy of this overview, a number of conclusions may be drawn:

- 1) Contamination by toxic materials is the major water quality problem faced by the nation. While dramatic cases of pollution from metal mining come to light from time to time, the most difficult and probably the most serious problems arise from the widespread use of chemicals in households, commercial establishments, industries, medical and research institutions, agriculture and forestry operations. The effects of these chemicals are imperfectly understood and both the technologies and institutions for their control are not well developed. The relationship between the incidence of cancer and chemicals in the environment is cause for grave concern.
- 2) Bacterial pollution remains an important problem on the east and west coasts and in the Great Lakes, limiting recreation opportunities and preventing the use of valuable shellfish resources.
- 3) Floods and droughts remain significant problems in many parts of the country and since they are natural phenomena that can be only imprecisely predicted, the expedient of human adjustment to them must be continued indefinitely.
- 4) The modification of hydrologic systems through dams, dykes, channels and drainage works have had and can be expected to have consequential major ecological effects. Pressures for further developments of this nature cannot be expected to diminish. We must ensure that the basis exists for estimating the effects of these developments with sufficient accuracy

to permit confident and prudent decisions regarding the resultant impacts. Equally important is to design our planning and decision-making processes to be assured that the effects of a proposed development will be fully assessed and weighed before an irrevocable decision is made.

5) Since the water environment which affects most Canadians is shared with the people of the United States, high priority deserves to be given to understanding how trans-boundary waters can be managed to serve the best interests of the people of both countries.

PROPOSED COURSES OF ACTION

This broad overview and the conclusions do not permit the detailed definition of specific courses of action. Nevertheless, they provide a basis for suggesting some things that the federal government can do to deal with existing or prospective problems. In developing these suggestions, it is recognized that the nature of the federal system requires a cooperative intergovernmental endeavour to deal with most environmental problems. The following courses of action are proposed:

1. The federal government should utilize its authority and influence to organize and implement comprehensive regional pollution control programs in cooperation with provincial and municipal jurisdications.

Pollution problems vary greatly from region to region across the country. A comprehensive program for an area, in addition to end-of pipe treatment of sewage, could embrace such activities as research on the ecological system affected and the technologies of control, the regulation of toxic pollutants at their source, and the utilization of economic incentives to encourage reduction in waste discharges. These types of activities must be tailor-made to accord with the regional situation. Integrated programs that are sharply focused upon regional and local problems will have a much larger payoff than national programmes limited to a particular industry or concerned with a particular activity such as research. Such cooperative integrated programs can be developed without instituting formal federal-provincial organizational arrangements and agreements.

2. The federal government, in cooperation with provincial authorities, should initiate an audit of the environmental effects of river structures (dams, dykes, channelizations) that have been built in Canada with a view to improving the bases for predicting the environmental effects of structures proposed for future development.

New structures will continue to be built in Canada for electric power production, water supply, flood control and navigation purposes. Because of the complexity of the systems affected, it is difficult to estimate the environmental effects of a structure. By systematically assembling information about the effects of existing structures, an improved basis will be created for estimating the effects of proposed new structures. Recognizing that the effects of any two structures will not be the same, a general body of knowledge will be accumulated leading to more accurate predictions of environmental effects.

3. The Department of Fisheries and the Environment should seek the cooperation of all agencies - federal, provincial and local - concerned with water resources development in notifying the Department as soon as the planning of a structure is being initiated and in conducting a fully adequate assessment of the potential environmental effects of the structure.

Attention has been called to the fact that detailed engineering studies and plans are often nearly completed before environmental impact studies are initiated, leading to hurried and superficial investigations. It must be fully accepted that environmental investigations should be initiated concurrently with the engineering studies if an adequate environmental impact assessment is to be assured.

4. The federal government should take the initiative in working with the provinces to launch a program to reserve water areas of critical environmental significance, including outstanding wild rivers and wetland areas that provide habitat for fish and wildlife.

On both the east and west costs, much of the original marshland has been drained or otherwise destroyed. It is proposed that in each province federal and provincial officials collaborate to identify the wetlands that should be reserved, and to develop specific plans to prevent future impairment of such areas or indeed the rehabilitation of impaired areas. The federal government recently supported studies of individual wild rivers. It is urged that appropriate federal agencies review these studies and seek the cooperation of provincial authorities in developing a program for preserving the wilderness character of outstanding wild rivers in Canada. Such an effort may occasion the development of both federal and provincial policies on this subject, but this is the kind of problem on which leadership by the Department of Fisheries and the Environment should be exercised.

REFERENCES

- H.H. Harvey. Aquatic environmental quality: problems and proposals. Fisheries Research Board of Canada Report No. 12, Ottawa, 1976, p. 14.
- ² Ibid.
- ³ *Ibid.*, p. 15.
- 4 Annual Report 1976, Resources for the Future, Washington, p. 29.
- ⁵ H.H. Harney, op. cit., p. 28.

NUCLEAR POWER AND THE ENVIRONMENT F. Kenneth Hare

During the year the Council devoted considerable attention to the possible impact of nuclear power generation on the environment. As Canada's commitment to such power increases, it will clearly be necessary to monitor the effects on plants, animals, water bodies and air, as well as on man himself. At the end of 1976, total installed capacity amounted to 4,000 megawatts, with 7,800 megawatts under construction, mostly in Ontario. By comparison with other sources of electric power this was small. But recent estimates from federal sources predict that installed nuclear capacity may reach or exceed 75,000 megawatts by the year 2000, equal to the world's capacity in 1975. Clearly this is a formidable target, and the public is entitled to assurance that its impact on nature and on human health will not be damaging.

Accordingly, Council commissioned a study of the issue from H.W. and H.E. Duckworth, A. Porter and J.S. Rogers. This report¹ was received in final draft form at a meeting of Council in August, 1976, and was published in January, 1977. Only a summary of its contents is attempted here.

Canada's reactor system, CANDU, developed by Atomic Energy of Canada, Ltd., is different from all other widely used systems. It is fueled by natural uranium, which is mostly made up of the isotope uranium-238, but contains 0.71 per cent of the fissile isotope U-235. Other reactor systems, notably the U.S. light water reactors, require that the proportion of U-235 be enriched to over three per cent. In CANDU reactors, the use of heavy water (deuterium oxide) as coolant and moderator makes this enrichment unnecessary. In operation - for example at Pickering Generating Station 1, owned by Ontario Hydro - the CANDU system has proved itself capable of producing electricity cheaply and reliably. It is expected that for the remainder of the century this system will produce all of Canada's nuclear power, and will remain competitive in costs with all rivals.

The uranium fuel used comes from Canadian mines, where it is milled into yellow cake by processes that create large volumes of tailings, whose management creates the first major environmental hazard related to the industry, mainly because they contain radium-226. This yellow cake is refined to uranium dioxide, UO₂, at Port Hope by Eldorado Smelting and Refining Co., where other wastes must be disposed of.

¹ Environmental aspects of nuclear power development in Canada: adequacy of the information available. Occasional Paper No. 2, Canadian Environmental Advisory Council, Ottawa, 1977, 53 pp.

The UO₂ is processed into ceramic pellets by plants in Port Hope, Peterborough and Toronto. It is assembled into bundles, and then into the rods that are actually inserted into the reactors. Little or no environmental impact is associated with these manufacturing stages, and the rods can be handled without risk.

After irradiation, however, the rods emerge from the reactors intensely radioactive, and require thorough shielding. The radioactivity arises from the fission products (elements like strontium-90 and cesium-137) into which the U-235 is split, and from heavy metals called actinides, of which plutonium-239 is the best known and most feared. Most of the fission products decay within days or weeks and almost all will have vanished within 600 years. But several of the actinides remain radioactive for millennia: plutonium -239. for example, has a half-life of 24,000 years. Hence the irradiated fuel must be isolated from living organisms for long periods. It produces large amounts of heat as well as radioactivity. It is stored at the power stations themselves in water-filled "bays" for up to five years. Thereafter it must be removed to other storage facilities, or disposed of in underground repositories. far in Canada all of it remains at the power stations, posing little present environmental hazard. But storage facilities at Pickering and Bruce Generating Stations will be full by the middle or late 1980's, and other facilities will then be required.

The operation of reactors produces considerable volumes of less radioactive waste, chiefly in solid form, and these too must be stored and ultimately disposed of. Small amounts of radioactive liquid and gaseous wastes escape to lakes, rivers and the atmosphere, where they are dispersed. The CANDU system produces considerable amounts of the hydrogen isotope tritium (H-3), which occurs in both liquid and gaseous forms. Small amounts escape from the reactors.

In due course Canada will have to decide whether to dispose of irradiated fuel or to reprocess it to extract the plutonium-239 for reuse as a fuel (plutonium is fissile, like U-235). The latter can be used in breeder reactors, or the CANDU system can be adapted to use the fertile isotope Thorium-232, which exists in large quantities in Canada. If such further developments are agreed to, there will be some increase in releases of radioactivity to the environment. Moreover, large volumes of liquid highly-radioactive wastes will be generated, and these will require elaborate and costly solidification procedures.

The Council report on the industry's operations identifies the potential environmental and health hazards as follows: (i) occupational exposure of uranium miners to radon gas in the mines themselves; (ii) escape of radioactive radon gas from mine and mill tailings, and from refinery wastes, together with the accumulation of radium-226 in the tailings (radium emits hazardous radiation); (iii) accidental release of radioactive materials from reactors above the derived release limits imposed by the Atomic Energy Control Board; (iv) deleterious effects of radioactive wastes or irradiated fuel from reactor operation, or from future reprocessing plants; (v) effects on aquatic ecosystems of the use of lake waters for cooling systems; and (vi) effects of accidental releases of hydrogen sulphide from heavy water manufacturing facilities (for example at Port Hawkesbury, Nova Scotia, and Bruce, Ontario).

The Council has reviewed each of these potential hazards. The report it commissioned indicates that in most respects the industry has performed well in protecting the public and the natural environment against radioactivity. This is especially true of the power stations, which are operated at well below one per cent of the levels of release permitted by the International Commission on Radiological Protection, whose standards are applied by the Atomic Energy Control Board. These stations have an accident-free record, and are so designed as to be likely to contain almost any conceivable accident. The report also reviews the various potential health effects of radiation exposure, from natural sources as well as man-induced. It finds that medical uses of X-rays and nuclear aids far exceed the doses to the public received from the nuclear industry. Nevertheless certain matters give concern and call for further action.

The report notes, for example, that past practices in the mining and refining of uranium have resulted in radioactive contamination of the environment and subsequent harm to individuals. Public concern has been aroused by events at Port Hope, Bancroft and Elliot Lake, chiefly because of surface occurrences of radon gas. It suggests that "further research is needed both with respect to the pathways followed by the relevant radionuclides and to the safety procedures that are appropriate." The Ontario Royal Commission on Safety in the Mining Industry has attacked a major part of this problem - that of occupational hazards. The rest of these environmental hazards are in a less satisfactory state.

A second area of concern is that regulation and standards within the industry are based on overall levels of human exposure to radiation (weighted as to type) without reference to the radiation source. More knowledge is needed of the effect of specific radionuclides on

specific organisms (not merely on man). This is particularly true of tritium, which the Canadian reactor system produces in larger amounts than do other branches of the nuclear industry world-wide. Canada has a specific responsibility to investigate the effects of this radionuclide, which invades living tissues with great ease.

The report makes the point that an adequate source of cooling water is as vital to efficient power generation as the heat provided by the nuclear reactors, since for the foreseeable future the heat will be converted into electricity generators driven by steam turbines. Existing stations use lake water and this will inevitably continue. The impact of the heat released into the lakes is imperfectly understood. It needs to be studied separately for each specific generating station site. The same applies to future heavy water plants, since these involve the extraction of deuterium oxide from very large volumes of lake water. This is clearly an area of concern as regards Canada's inland fisheries, amenities and water quality.

The authors also express concern about the possibility of fuel reprocessing to extract plutonium in spite of the increase in hazards involved. "A dependable Canadian expertise must be developed", the report concludes, "particularly with respect to the handling of dissolved fission products and the purified plutonium". A related concern is that for procedures for forestalling terrorism and sabotage, since these are greater hazards if fissile materials such as plutonium-239, uranium-235 or uranium-233 (produced in the thorium cycle) are separated in significant quantities in this country.

The report finds that arrangements for the ultimate disposal of radioactive wastes, or perhaps irradiated fuel, are highly tentative, and that their environmental consequences are "nebulous". A specific plan for such disposal is urgently needed. By the year 2000 if the planned expansion of nuclear power production takes place, 50,000 tonnes of irradiated fuel will have accumulated in surface storage in Canada, and will by then be increasing by about 10,000 tonnes per annum. If these are reprocessed, a large volume of high-level liquid waste will result. Clearly a waste disposal plan is an urgent necessity, especially since it will take many years to put into effect.

In conclusion, the authors find, and the Council agrees, that future energy needs should encourage conservation rather than demand, and so reduce the burden on the environment. Prediction of future energy needs should be based on this principle.

RECOMMENDATIONS

- 1. More research is needed into the impact of <u>specific</u> radionuclides on man, plants and animals (and in particular of the role of tritium), as distinct from the impact of aggregate radiation doses.
- 2. Assessment of the effects of cooling water intake and output are needed for each future nuclear power plant, as are water intakes and output for heavy water plants. These assessments should take into account local terrain and biotic characteristics.
- 3. Further attention is required as to the safety procedures of the mining, milling and refining phases of the industry, especially as regards the proper management of tailings, liquid and gaseous wastes.
- 4. A national plan for radioactive waste disposal is urgently needed.
- 5. Procedures aimed at forestalling terrorism and sabotage should be continually reviewed.
- 6. Dependable Canadian expertise must be developed in the handling of high level wastes and their immobilization.
- 7. Provision for, and the prediction of, future energy needs should encourage conservation rather than demand.

THE ESTUARINE ENVIRONMENT Irving K. Fox

In any consideration of the Canadian environment, estuarine areas and their associated lands deserve to be separated from other water and land resources and given special attention.

The high level of productivity in estuaries is attributable in large part to the nutrients deposited as the velocity of flow diminishes when the river approaches the sea. This concentration of nutrients, combined with sunlight, which is able to penetrate the shallow water, causes plant life to grow exceedingly well. Plant growth in turn provides a rich food supply for organisms both in the water and on adjacent lands. As a result of this productivity, estuaries form the basis for a large proportion of the fisheries resources of Canada. All anadromous fish pass through and depend on an estuary during important stages of their life cycles, and, because of the available food supply, other species tend to be much more abundant in estuaries and adjacent coastal areas than in other parts of the sea.

Along the land-water interface of estuaries are transitional areas of sloughs, wetlands and marshes. These provide resting, feeding and nesting grounds for waterfowl and the habitat for mammals that feed on aquatic organisms. Beyond this transition zone are the floodplains with their cover of highly productive silts. As a result, estuarine flood plains often provide some of the richest agricultural land, and where this has been left in a wild state, it is likely to be unusually productive of forests and wildlife.

Other features of estuarine and delta areas make them particularly attractive locations for human settlement. The level flood plains and deltas simplify the development of urban centres and the construction of roads and railways. Access to the sea and thus to international commerce, as well as the generally favourable maritime climate, foster urban growth. Approximately two-thirds of the population of British Columbia are located near estuaries. In the Atlantic Provinces, 75 percent of the population live close to the fresh-salt water interface. Québec City is situated on the estuary of the St. Lawrence River.

Despite the lack of any comprehensive examination of Canadian estuaries, there is mounting evidence that their natural productivity is being seriously impaired. Along the Fraser estuary, about 70 percent of the original salt marsh, about 30 percent of the tidal freshwater marsh and almost all other flooded habitat have been destroyed. Eighty percent of the salt marshes of the Maritimes had been reclaimed by 1920. Pollution is a serious menace because of discharges of urban and industrial wastes and contamination by urban runoff. The deltas and flood plains of Canada continue to be drastically changed through human use, the first step usually being to utilize these lands for agricultural purposes, and with the growth of cities, agriculture giving way to urban-industrial development.

These modifications of estuarine environments might be viewed as signs of progress. Although developments in these areas have produced substantial benefits, studies of particular estuaries indicate that environmental damage is not being carefully weighed in justifying certain developments. Planning procedures seldom exist which seek to guide developmental activities so that they will be in harmony with the natural environment. The Department of Fisheries and Environment, in cooperation with the British Columbia government, is seeking to remedy this situation with regard to the Fraser estuary, but numerous other estuaries where similar problems exist are not receiving comparable attention.

Because of the social and economic importance of estuaries to the Canadian people, the Canadian Environmental Advisory Council has concluded that two kinds of actions are required to assure prudent and appropriate use of estuarine resources. One is that a comprehensive overview of Canadian estuaries should be undertaken - not a time-consuming and costly inventory, but an assembly of readily available information indicating the general condition and emerging problems associated with estuarine use in the country.

The second step is to develop a *strategy* for assuring that future changes in use result in the most appropriate use of such resources.

Council has prepared a draft report, referred to in the 1975 Annual Review, which analyses the problems of managing estuarine resources and proposes a strategy for dealing with them effectively. This report is planned for submission to the Minister before the end of 1977.

THE PROBLEMS OF ENVIRONMENTAL POLICY-MAKING AT THE FEDERAL LEVEL Philippe Garigue

Introduction

The increased concern of Canadians about environmental problems gave rise to demands on the federal government that it take suitable steps to solve them, and resulted in the creation in 1971 of the Department of the Environment as the institutional means for administrative decision-making and policy-making for the protection and quality of the environment. Since then, government activities in this field have increased rapidly. However, Canada's size, regional diversity and traditional orientation towards industrial growth, as well as its political system of competitive competence between levels of government hampered the development of policy for environmental quality. Several Acts have been passed by the federal government - the Canada Water Act, the Clean Air Act, certain amendments to the Fisheries Act, and in 1975, the Environment Contaminants Act - yet there is no overall integrated structure to this legislation. Emission and effluent standards have been set, air and water monitoring stations established, pollutants have been identified, and the start of an administrative assessment and monitoring procedure established. Yet, because responsibility for environmental quality is shared with other federal departments and agencies, such as National Health and Welfare, Transport, Agriculture, Energy, Mines and Resources and Northern Affairs, as well as with appropriate provincial departments, the present situation results in fragmentation and segmentation.

Coordination has therefore become essential to environmental policy-making in Canada, subsuming all relevant fact-finding research, appropriate organization for the preparation of legislation, the development of a structure of complementary activities between the various federal departments, and between the federal and provincial governments. The goal is that each decision be made practicable in terms of the interests of the total Canadian population. Indeed, policy-making as a tool of coordination has become vital to the task of achieving environmental quality in Canada.

The range of federal policy-making

Federal policy-making in environmental questions can be defined as the dynamic coordination as well as the legislating and administrating process aimed at protecting and improving the quality of the environment in those areas of federal responsibility, as well as in those areas where it shares such responsibilities with the provincial governments. Because of this, environmental policy-making in Canada is now determined by the relationship between the distribution of powers and administrative responsibilities at all levels of government, and by the causes of environmental deterioration. This is illustrated by the following points:

- the deterioration of the environment in Canada, 1) as elsewhere in the world, is largely the product of the impact of industrialization, urbanization, scientific and technological innovations and the development of linked sets of activities, such as mass transportation, resources exploitation, mass leisure activities, and so on, which have experienced remarkable vertical acceleration because of population growth and the increased level of consumption of resources. A geographical proliferation has also taken place owing to an everwidening spatial network of activities. Because of this, federal environmental policies should be considered as the multi-dimensional means to identify effective solutions to these impacts, in collaboration with all appropriate private and public bodies and involving the affected populations.
- the deepening interrelationship between the crisis in the environment and all aspects of modern life has produced trends which have circular multilevel consequences. This interdependence suggests that what Canadians want as consumers cannot be separated from what they do as producers.

 Accordingly, federal environmental policy-making involves not only an effort to identify the kind of nuisance control which can be developed, but also to determine what changes are required in the total behaviour pattern of Canadians, so that an appropriate program for improvement can be developed. This implies new governmental activities (such as developing technics of change which will ensure that Canadians will adapt and modify their

present and future patterns of expectations), as well as older, more traditional types of activities. As a result, one of the priorities of policy-making has become how to find the means to change the present expectations of Canadians into the requirements for an ecologically sound industrial-economic growth.

- 3) this interdependence between all aspects of environmental questions also implies that a new type of relationship must be established between all the activities of Canadians, as well as between the organization of scientific research and the transformation of public opinion and values into political decisions. Without the appropriate integration between i) the various federal departments and other levels of government; ii) the findings of scientific research; and iii) the expressed wishes of the Canadian public, policy-making is at best only an exercise in rhetoric.
- 4) the radical increase in the multi-dimensional causes of deterioration (ie., the chemical sea, the accelerating rate of exploitation of resources, the multiplication factor of technological innovations, etc.) also underlines the need for a matching rate of change in policymaking. The growth of large scale undertakings the search for oil and gas in the Arctic Islands, the James Bay project, the proliferation of nuclear reactors means that each decision on these projects attains new irreversible levels in the scale of environmental change. There is, therefore, a need for a corresponding upgrading of policy-making.

The ever-widening scope of environmental policy-making can be represented by a ratrix (Figure 1) showing a correlation between certain objectives and means with policy-making. This matrix indicates not only the complex nature of the activities to be covered, but also the necessity to gradually develop policies which will integrate all relevant actions according to the selection of objectives and the means to achieve them.

Figure 1. AN ELEMENTARY MATRIX OF ENVIRONMENTAL POLICY-MAKING

MEANS

iffic Policy-making	Conceptualizing Presenting policy a conserver alternatives for environmental quality	Understanding, Identifying planning and long term managing consequences of ecosystems activities	Development for Defining the norms for priorities measuring impact and monitoring	Project and Setting the program operational structure
Scientific	Concept a conse society	Understan planning managing ecosyste	Developme norms for measuring and monit	Project program evaluat
Public participation	Changing public values	Mobilizing public opinion	Presentation of public interests	Liaison with NGOs
Economic industrial	Managing the conserver economy	Making trade- offs between technological innovations	Redistributing economic benefits	Evaluating social cost of industrial impact
Levels of government	Overall planning coordination	Enforcement of legal penalities	Identification of solutions acceptable to all parties involved	Distribution of jurisdictional powers between levels of government and the various agencies
	The ecologically balanced society	Environmental constraints on growth and development	Solutions to conflicting interests	Appropriate administrative re-structuring for environmental protection

A SUGGESTED FRAMEWORK OF GOALS FOR A FEDERAL COORDINATION OF POLICY-MAKING Figure 2.

	- 71 -		
Non-government organizations	-Representation of total Canada population through appropriate structure -Mobilize total participation for support or sanction	Interest groups representation to regulatory authorities	Local group representation
Research	-Feasibility studies and evaluation of total trends -Developing total ecosystem analysis -Coordination and explanation -Innovation	-Analytic input to administrative and design of projects -Innovation	Specific program evaluation
Administrative organizations	-Monitoring total change change -Policy interpretation total trends -Monitoring legislation-Developing total ecosystem analys -Information -Innovation	-Policy interpretation -Specific project design -Nonitoring legislation design of projects -Staffing -Information	-Local performance management -Information
Levels of government	-Policy-making on change and resources allocation -Monitoring legislation -Monitoring legislation federal departments and crown corporations -Information	Policy-making and resources allocation on specific projects and programs at the provincial level	Defining local priorities
Functions and Participants Jurisdictions	Federal government (including federal crown corporations)	Provincial governments (including provincial crown corporations)	Municipal governments

It is also possible to determine the actual level of federal environmental policy-making by locating the present activities of the federal government on the matrix. Finally, the matrix indicates the desirable end goals or priority objectives of federal policy-making in Canada.

The end goals of federal policy-making

The importance of this question can be appreciated by the fact that since 1971, Environment Canada has been experiencing a change in objectives, as well as in organization, which has brought together public values and private interests, along with scientific research and public opinion, into a continuous dialogue concerning the priorities of environmental policy-making. At the time of the creation of the Department when services which existed in various government departments were assembled, it was the managerial responsibilities for certain natural resources, i.e., fisheries, forestry, and so on, which were the determining priorities in the activities of Environment Canada. It became gradually evident, however, from the efforts to establish what should be the environmental policy of the federal government that the activities of the Department had to be extended into new fields to cope with simultaneous modes of action over the full range of environmental questions, as indicated by the following considerations:

- 1) the growing number of federal responsibilities for environmental questions - international boundaries problems, coastal waters, trans-provincial pollution, etc. - made it necessary to enlarge the role and extend the activities of the Department into fields which were not covered by the services which had been regrouped. This signified new and specific orientations, different from the "managerial" role of the Department, in such areas as assessment, monitoring, etc.;
- 2) the regional character of certain environmental problems meant also the creation of a decentralized structure with regional field offices to deal with specific local projects, as well as the establishment of liaison with regional and provincial interests. It also raised the question of the specific role of the federal government in these regional problems, and whether these activities should not be left to the competence of the provincial governments;

- 3) this led gradually to the growth of a collaboration with provincial governments on projects of national interest, and the creation of intergovernmental commissions or activities in which the federal government had a specific function;
- 4) it also became apparent that the need for scientific research, the establishment of enforcement standards and the creation of an administrative structure for impact assessment and monitoring procedures required an increased involvement of federal resources in these areas, since many provinces were without these capabilities.

The gradual realization of the need to establish the relevant policy structure has now reached the level where the organization of Environment Canada must go through a new phase of adaptation. Although this adaptation process has been initiated within the Department, neither the organizational nor the legislative enactment have yet involved all the aspects presented in the matrix. On the contrary, only a limited number of problems have been clearly defined, and the global approach to policy-making so as to reach all the required objectives has not yet been developed.

While the Department is aware of the need for change, certain questions seem still to be beyond its field of competence. For instance, the integration of economic and social priorities with ecological values has not occurred in the assessment procedure. This integration is difficult because of the involvement of different levels of government, as well as federal departments, in relating environmental questions with socio-political priorities. Regrettably, the required coordination is still being discussed. As a result, when for various reasons the integration of socioeconomic interests with ecological priorities cannot be coordinated by the Department, confrontation between public and private interests has developed. This is reflected in the alternating cycle of encounters on environmental issues which is found in Canada and in the adversary situation which often occurs. Furthermore, the predominance of local specific interests over national general interests has tended to force a type of bargaining on each project which has resulted, in many cases, in short-term solutions. Because of the lack of resolution of these questions, federal policy-making has been limited until recently to a relatively low level of adaptation of Canadian society to environmental problems.

The acceptance of federal government responsibility for the provision of conditions for the public good of all Canadians implies that the present situation must be gradually changed. Procedures must be developed to give priority to coordination in federal environmental policy-making, leaving the more specific local problems to provincial governments. Under the conditions in which federalism signifies more than the local interests of each Canadian community, there is a need for the intervention of the federal government in setting objectives which, even if not readily perceived by Canadians as adaptive to their own specific environments, are nevertheless fundamental for the condition of the total Canadian environment.

The choice between objectives which concern specific projects and those which concern national programs becomes a special challenge to reorganize responsibilities within the federal government to provide a new and emerging model of government action on environmental problems. This new orientation is suggested in Figure 2.

The present problems of environmental federal policy-making

The emerging trend, because it demands the collaboration of all concerned, raises constitutional, organizational, socio-economic, educational and other types of questions. Moreover, the extent to which federal policy-making can be developed in Canada to serve these objectives depends on whether all of the parties involved understand the need for cooperation. For instance, under the present system of federal-provincial relations, it is traditionally easier to deal with projects rather than with programs, although this type of administrative action is a less effective mode of adapting Canada to the necessary environmental changes, as is exemplified by the question of acid rain in the Maritimes. The quality of compromise between levels of government on specific projects should not become that of a downgrading of the level of long-range planning for environmental quality at the federal level. There is need in Canada for a general orientation of environmental questions which encompasses physical, biological, socio-economic and cultural change. The history of Canada has been that of an evolution from a less to a more structured organization, from simplicity to diversity. Without entering into utopian thinking, it becomes evident that federal policymaking is the instrument of a gradually evolving adaptation of our national activities into something which goes beyond the present debate on the limits to growth. The federal government

must promote the kind of orientation which will allow Canadians to be competent in finding solutions to the problems of social-economic growth and ecological equilibrium. This would also establish a new model for Canadian society and a new image of environmental quality for Canada.

It is, of course, realized that the need for policies for each of the ecosystems and for the totality of Canada does not imply that the federal government should establish legislation governing all environmental aspects, since this would demand a centralization of administrative control unacceptable in our federal system. It does mean, however, that the federal government should collaborate with all concerned to develop a coordinated course of action.

In the face of growing environmental crisis, and the urgency of finding adequate solutions, the past efforts of the federal government have been seen and criticized by many environmental citizens' groups as incremental and limited. In many ways, what is now requested suggests that federal environmental policy-making must develop new types of activities in line with the realties of each ecosystem, and a procedure for coordination among the provinces. The current efforts to find adequate solutions to the pollution of the Great Lakes, the Beaufort Sea drilling, the management of coastal zones, and so on, indicate that the kind of sectorial confrontation which has marked the history of environmental policy-making in Canada must give place to a more integrated approach. New types of inter-governmental institutions as well as arrangements must be developed, as well as a new form of departmental organization for the development of federal environmental policy-making.

The needs for setting new administrative and organization priorities

In the last few years, it has been pointed out by many federal government organizations, as well as by private bodies interested in environmental policy-making, that no goal is more central to environmental protection than long-term policy making. The present administrative and organizational system at the federal level must be seen as a first step toward the creation of a more suitable system. The experience of the past five years, and the present situation, can be summarized by the following propositions concerning the next objectives of federal environmental policy-making, and, therefore, the changes that should take place:

- there exists in each Canadian ecosystem an interdependence of natural resources and human activities,
 creating a closely interrelated whole. The orientation of projects, programs and policy-making must
 take into account the realities of each of these
 ecosystems irrespective of the political boundaries
 or the levels of administrative competence. The
 kind of measure to be developed must therefore be
 specific to each of these systems, and thus the
 basic terms of reference of policy-making should be
 the realities of these ecosystems;
- 2) nevertheless, because certain environmental questions are general to Canada, there is need for policies which establish a general orientation and a coordination of environment protection for all ecosystems. This gives a special role to the federal government, and the range of these questions should determine its policy-making;
- 3) the segmentation of responsibilities between levels of government as well as between departments has resulted in difficulties in establishing programs and policy-making. The present situation has no logical or organizational justification and prevents the development of long-term policies. There is, therefore, an urgent need for a revision of the present structures.

Conclusion and Recommendations

The creation of Environment Canada indicated the federal government's effort to take a new orientation in environmental questions by establishing certain priorities to policy-making for environmental protection and quality. However, since then, the segmentary nature of the Canadian political system has perpetuated a number of difficulties which have worked to the disadvantage of environmental protection, and may well continue to do so.

It is recommended that the federal Minister for the Environment take the initiative of calling together a Canadian conference on the environment, to discuss with all concerned (provincial authorities and the relevant private organizations) the steps which should now be taken to find solutions to the problems outlined in this paper. In particular the conference should study and report on the following aspects:

- 1) what are the priorities of environmental policies in Canada, for each ecosystem as well as for the total population?
- 2) what new social priorities should be developed among Canadians, through education and publicity, so that they gradually evolve into the general terms of reference of environmental quality in Canada?
- 3) what should be the kind of growth in the various activities of Canadians compatible with the needs of a conserver society?
- 4) what should be the organizational structure of competence for action between levels of government as well as between public and private bodies and the general population?

The dynamics of the Canadian political system strongly favour a fragmented approach to questions, an approach contrary to the requirements of environmental quality. Unless the dynamics of our present system can be corrected by means of a different set of coordinating capacities and programs arising from a new and collective awareness of the problems, efforts to introduce fresh policies by means of legislation are doomed to be disappointing. It will not suffice to try to improve procedures of formal administration within the present Department of the Environment. A new approach must be attempted. The need to move beyond the present situation is the basic reason for proposing a Canadian conference on the environment.

SYNTHESIS

Ian McTaggart-Cowan

This overview of the state of the Canadian environment in 1976 reveals that man's impact varies greatly from region to region. We are perpetrating a completely unacceptable outrage on the national heritage on which the future of our society depends. This symposium is a treatment of selected significant environmental aspects and any reason for optimism is derived only from observing that we are recognizing these pervasive problems and beginning to pursue effective solutions.

As would be expected, the major airborne pollutants - ozone, oxides of sulfur and nitrogen, and hydrocarbons - are products of heavily industrialized parts of Canada. Their maximum acceptable limits are regularly, though locally, exceeded. Most AIR serious air pollution events in the most susceptible areas of southern Ontario occur during stagnant summer weather. Across Canada, some 60 percent of the atmospheric pollutant oxides are derived from the combustion products of vehicular traffic, though industry is responsible for much of the air pollution in Montréal, Sudbury and in the Toronto-Hamilton area. Over those other areas where atmospheric pollution is a problem, real gains in air quality are to be made through improved efficiency of automobile engines.

The most important aspect of land use we have identified is the steady conversion of higher quality agricultural land to non-agricultural uses that are likely to be irreversible. While statistical claims have been made that overall the amount of arable land in use in Canada has not declined, the crude acreage figures conceal important aspects of the problem. Close to urban centres, where transport costs are minimal, high quality land with a capacity for diversified crop production is being destroyed for urban growth and replaced by land of lower productivity, less versatility and higher marketing costs.

The driving force behind the change is identified as economic. "The addition of an estimated 8.2 million people to the Canadian population by 2001 will require another 2000 square miles (of land) at present densities... Historically about half the farm land that has been lost to urbanization has come from the best five percent of soils. Accordingly, it is asserted that we cannot afford to lose another 1000 square miles of prime farmland to urban development that could almost as easily locate elsewhere".

The problem is one of setting priorities and weighing benefits against costs. It is clearly within provincial jurisdiction and already some provinces have resorted to legislative regulation to control the economic pressures which are seen as driving land use decisions in undesirable directions.

The historical apprehension about bacterial contamination of water supplies continues in some parts of Canada that have not undertaken acceptable levels of sewage treatment. This is WATER particularly true of the St. Lawrence Valley in Québec, where 90 percent of domestic wastes are discharged without treatment. In general, across Canada, an increasing number of communities are treating their sewage, and the levels of treatment are rising.

Dramatic cases of toxic pollution from industrial wastes have been in the news and cause justifiable dismay: mercury in Québec, Ontario and the Maritimes; arsenic in some gold mining areas; lead from refineries. Indeed, pollution from mining and smelting operations remains as a concern wherever minerals are produced and processed, and constant vigilance is required to ensure that no serious contamination results. Environmental abuse by the pulp and paper industry, only partly under control, continues to be cause for anxiety. Mounting evidence demonstrates that airborne wastes, especially sulfur dioxide, is causing critical acidification of downwind water bodies. Atmospheric fallout of lead and PCBs are disturbingly dominant features of the chemical budgets of many Canadian lakes and streams.

It has become evident that one of the most serious causes of toxic pollution of fresh waters is of urban origin from hospitals, universities, industry and from runoff from streets and urban land. The numerous and complex toxicants have many known effects including the killing off of aquatic organisms, rending others unfit for human use, and their entry into food chains has been demonstrated. Undoubtedly other consequences are not yet discovered and almost every new analysis is cause for concern.

We have identified the tasks ahead as a) the recognition of the distribution and specific nature of water pollution; b) the strengthening of the research base of water quality management; and c) the improvement of the coverage and sensitivity of monitoring of water quality. Meanwhile, existing standards and regulations require rigorous application.

A different kind of environmental concern arises from our inappropriate response to flood-prone and drought-prone lands and the failure to recognize marshes as of greater importance as water bodies than as drained land. A further anxiety arises from our failure to consider second order consequences when water regimes are altered for hydro-electric development.

We find that Canada has failed to manage its estuaries in a manner fully compatible with long term public interest. Jurisdiction over estuarine lands and waters in Canada is often divided between municipalities, regional and provincial governments

ESTUARIES and more than one federal government department.

The result has been piecemeal decisions and destruction by seemingly insignificant incremental changes. The critically important biological role of estuaries in the maintenance of many stocks of commercial fishes has been generally ignored.

There are moves in progress to provide for better integrated decision-making for estuary/delta areas but as much as 50 percent of many productive areas has already been lost.

The responsibility for conservation management of Canadian wildlife is shared between the two senior levels of government. Most of our wildlife species remain in good numbers and it can be said that Canada retains its original vertebrate fauna largely intact, though some species are substantially WILDLIFE altered in numbers. Extinctions have occurred and involve more subspecies than species. In this review, we have categorized species which require special conservation measures under three groups: endangered species, i.e., under immediate threat of extinction; depleted species, which are still present in numbers adequate for survival but continuing to decline; and rare species, present in very small numbers or in very restricted and specialized habitats. The endangered species include seven mammals, five birds, five reptiles, four amphibians, eleven freshwater fishes and four species of freshwater molluscs.

In the opinion of the Canadian Environmental Advisory Council, there is room for improvement in the legislation and in the organizational arrangements designed to foster the conservation of Canadian wildlife.

Canada, like other nations with a competence to use nuclear energy for the generation of electricity, is engaged in serious debate as to the future course of action it should follow. Canada has not used enriched uranium in its CANDU reactor and does NUCLEAR POWER not produce or use plutonium. None the less, potential environmental and health hazards exist from present technology in the form of radon gas in ores and tailings; radium 226 accumulation in tailings; accidental release of radioactive materials from reactors in excess of safe limits; release of heated cooling water into lakes and streams; accidental release of hydrogen sulphide from heavy water manufacturing plants.

In most respects, the Canadian nuclear industry has performed well. This is especially true of power stations. They have operated at less than one percent of permitted levels of release of radiation; they have been accident-free and are designed to contain almost any conceivable accident. Nevertheless, certain concerns remain.

There has been contamination of the environment from the mining and refining of uranium. Not enough is yet known about the impact of different sources of radiation exposure on workers in the industry. This is especially true of tritium, which is produced in large amounts by the Canadian process. Most importantly, the Council has serious concern over the possible reprocessing of fuel rods to produce plutonium. This is a highly dangerous poison and may be impossible to control so as to avoid exposure of people to serious hazard through accident, sabotage, terrorism or act of war.

It is generally accepted that the federal government has the responsibility to provide conditions for the public good for all Canadians. We see policy-making as a tool of coordination vital to the achievement of this responsibility by the federal government, with respect to the maintenance of environmental quality. Federal

POLICY-MAKING responsibility for environmental quality is divided between seven departments, and the necessary coordination is most difficult to achieve and

often lacking. The increasing complexity of the sources of environmental deterioration, and the widely disseminated impacts of the massive resource development projects planned or in progress require a greatly improved process of policy elaboration. Though considerable progress has been made, there is urgent need for more effective coordination of federal departments in developing coherent policies directed to the interests of all Canadians in maintaining a liveable environment. Coordination must also involve the findings of research and the roles of other levels of government.

The need for policies covering the various ecosystems and impact categories throughout Canada does not imply that the federal government should establish legislation governing all environmental aspects. It does mean that it should collaborate with all concerned to develop a coordinated course of action. In many instances, it will be necessary for the federal government to take the initiatory action.









Canadian Environmental Advisory Council Caracita Publications

Annual Review 1977-1978

STATE OF THE CANADIAN ENVIRONMENT

COAL MINING AND ENVIRONMENTAL MANAGEMENT ECOTOXICITY IN CANADA PUBLIC INTEREST GROUPS AND ENVIRONMENTAL POLICY



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Environment Canada Ottawa, Ontario

December 31, 1978

The Minister
Department of the Environment
Ottawa, Ontario

Dear Mr. Minister

We are pleased to transmit the Annual Review of the Canadian Environmental Advisory Council for the period 1977-1978.

As with its predecessors, this Annual Review contains a record of the activities of Council over this period, including the recommendations resulting from two meetings with the provincial advisory councils.

Part B comprises three reports by Council members on topics of environmental concern. They have been some time in preparation, reflecting considerable discussion among our members and the receipt of valuable comments from authorities from within the Department and from outside agencies and individuals. We are pleased to acknowledge this cooperation while at the same time take full responsibility for the observations and recommendations contained in the reports.

In publishing this Review, it is our intent to make our concerns about these matters available to Canadians, while drawing your attention to the conclusions or recommendations which follow each report.

Yours sincerely,

Ian McTaggart-Cowan Chairman Philippe Garigue Vice-Chairman

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council was established in 1972 by decision of the federal Cabinet, to advise the Minister of the Environment on:

- · such matters as may specifically be referred to it by the Minister;
- · the state of the environment and threats to it;
- the priorities for action by the federal government or by the federal government jointly with the provinces;
- the effectiveness of activities of the Department of the Environment in restoring, preserving or enhancing the quality of the environment.

The Council is composed of up to sixteen members who serve in an individual capacity and are drawn from a wide cross-section of Canadian life and from all across Canada. Officials of the Department of the Environment are not members of the Council; however the Department provides a continuing Secretariat.

To carry out its functions the Council undertakes studies and reviews of matters of environmental concern and policy, holds regular meetings to consider progress and developments with regard to these concerns, and prepares comments, statements and reports as appropriate. The Council publishes an *Annual Review* which includes a summary of the state of the environment in Canada, and from time to time reports on other matters of general interest and importance.

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary Canadian Environmental Advisory Council c/o Department of the Environment Ottawa, Canada KIA 0H3

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PUBLICATIONS

Annual Review 1973-1974. Part A - Activities 1973-1974. By Arthur Porter. Part B - Problems and priorities in the Canadian environment. By Pierre Dansereau.

Annual Review 1975. Part A - Activities 1975. By Ian McTaggart Cowan. Part B - Significant Canadian environmental problems. By J.P. Nowlan.

Annual Review 1976. Part A - Activities 1976. Part B - State of the Canadian environment 1976.

Air quality in Canada. By F. Kenneth Hare.
The encroachment of urban development on prime food land.
By Norman H. Morse
The status of Canadian wildlife 1976. By Ian McTaggart-Cowan.
The state of the water environment in Canada 1976. By Irving K. Fox and
J.P. Nowlan.
Nuclear power and the environment. By F. Kenneth Hare.
The estuarine environment. By Irving K. Fox.
The problems of environmental policy-making at the federal level. By
Philippe Garigue.

An environmental impact assessment process for Canada. Council Report No. 1, 1974.

An environmental ethic - its formulation and implications. Council Report No. 2, 1975. By Norman H. Morse. Preface by Pierre Dansereau. Foreword by Donald A. Chant.

Harmony and disorder in the Canadian environment. Council Report No. 3, 1975 (Occasional Paper No. 1). By Pierre Dansereau.

Environmental aspects of nuclear power development in Canada. Council Report No. 4, 1977 (Occasional Paper No. 2). By H.E. Duckworth, H.W. Duckworth, Arthur Porter and J.S. Rogers.

Report of the second joint meeting of environmental advisory councils. May 1977, Fort San, Saskatchewan. Council Report No. 5, 1978. Produced in collaboration with the Saskatchewan Environmental Advisory Council.

The management of estuarine resources in Canada. Council Report No. 6, 1978. By Irving K. Fox and J.P. Nowlan.

Reports of the first and second meetings of public interest groups with the Canadian Environmental Advisory Council. Council Report No. 7, 1978.

PART A

REPORT OF ACTIVITIES

MEETINGS

Council held seven full meetings in 1977, including two with representatives of Canadian environmental public interest groups, and one with the provincial advisory councils. Eight meetings were held in 1978, one with the public interest groups and one with the provincial councils. One meeting took place in the Fernie area of southeastern British Columbia in October 1977. All others were held in Ottawa except for those with the provincial councils in Saskatchewan and Prince Edward Island. The executive committee of the Council met ten times, usually between plenary sessions, and two special meetings were convened to review and plan the program of studies.

MEMBERSHIP

The composition of Council changed significantly during 1977-1978. Dr. Pierre Dansereau and Mr. Eric Gourdeau resigned in early 1977. The terms of appointment of Ms. Moira Dunbar, Mr. I.K. Fox, Dr. F.K. Hare, Mr. D.F. Miller, Dr. N.H. Morse, Dr. Arthur Porter and Mr. R.G. Rogers were completed in May 1978. Dr. Ian McTaggart Cowan and Dr. Philippe Garigue were persuaded to remain as Chairman and Vice Chairman for another year and were joined by Dr. Mervyn Franklin, Mr. Trevor Jeanes, Ms. Marjorie Loveys, and Mr. H.D. McRorie in May 1978 and by Dr. David Ahenakew, Mr. Thomas Beck, Dr. Robert Bergeron, Mr. Richard Brown and Mr. Jean Chollet in July. Dr. D.A. Chant and Dr. R.H. Hall were reappointed for additional terms.

ACTIVITIES

A number of officials of the Department of Environment attended Council meetings to discuss various topics: Dr. J.E. Brydon, on the Contaminants Act and toxicology; Mr. I.B. Marshall, on land despoilation and reclamation; Dr. H.F. Fletcher, on the ARK project in Prince Edward Island; Mr. F.G. Hurtubise and Mr. W.S. Tait, on two occasions, on the Environmental Assessment and Review Process; Dr. A.E. Collin on the department's involvement in the marine environment; Mr. R. Roberts, on the extension of fisheries jurisdiction; Dr. P. Finkle, on forest management; Dr. J. Vallentyne, on an international credo on the quality of the biosphere; Dr. M.C.B. Hotz, on departmental policy thrusts; Mr. J. Gérin, on northern pipelines policy; Dr. R. Slater and Dr. T.A.J. Keefer, on the departmental reorganization and mandate; Dr. H.C. Rothschild, on two occasions, on nuclear policy. Mr. E. Peterson, of Edmonton, joined in a discussion of northern environmental issues. Dr. O. Solandt told Council of the recently constituted Northwest Territories Science Advisory Board. Dr. P. Dyne and Dr. J.E. Gander, Department of Energy, Mines & Resources, contributed to a discussion of the effects of fossil fuels production and use on the environment. Dr. J.W. Harrison and Dr. A. Aitken joined Dr. F.K. Hare in briefing members on the problems of disposal of radioactive wastes. Mr. P. Bourgeois, Mr. R.A. Goodings and Mr. F. Quinn explained the objectives of the Federation of Associations on the Canadian Environment. The executive committee met twice with representatives of the Canadian Geoscience Council to explore the possibilities of closer liaison.

One of the major activities of Council in 1977 and 1978 was to organize a series of meetings with selected representatives of citizen groups concerned with the Canadian environment. The proceedings of the first two meetings have been

published, and a considered evaluation of the rationale behind this initiative, prepared by the Vice-Chairman, is contained in this Annual Review. A third meeting, in November 1978, centred around four position papers commissioned by the Department of Environment at the instigation of Council: the Conserver Society; wildlife protection; aerial insecticide forest spraying; and Canadian energy policy. The report of this meeting will be published in 1979.

In 1975, Council organized a meeting in Ottawa of environmental advisory councils, a summary of which appeared in the Annual Review for 1975. This liaison was renewed through an invitation from the Saskatchewan advisory council to meet in the Qu'Appelle Valley in May 1977, followed by a third meeting in June 1978 hosted by the Prince Edward Island council. Both of these conferences provided opportunities to view at first hand local environmental problems and to discuss in depth issues of common interest.

Resolutions arising from these meetings included the following:

Energy policy

- that a national inquiry be held on the question of a Canadian energy policy, with particular reference to nuclear power development including consideration of the complete nuclear fuel cycle.
- that a greater proportion of research and development expenditures be allocated to studies on alternate renewable energy sources.
- that advisory councils request their Ministers to recommend that the Canadian Council of Resource and Environment Ministers implement a national energy conference.

Land use and resource management

- that provincial councils urge their governments to develop provincial land use policies and guidelines.
- that provincial and federal governments cooperate in the development of national land use guidelines that would reflect provincial needs and priorities.
- that provinces recognize the uncertainty regarding sustained productivity of northern forests before classifying them as suitable for harvesting.
- that a vigorous program of studies of the regeneration and productivity of northern boreal forest be implemented immediately by appropriate federal and provincial agencies.
- that councils press for regional planning approaches beginning with identification of sensitive lands and development of land use plans and guidelines for such areas.

Environmental impact assessment

- that advisory councils press for the development and implementation of comprehensive environmental impact assessment policies in their respective jurisdictions.
- that adequate follow-up and monitoring procedures be included in the environmental impact assessment process.

- that councils press for public involvement in the assessment process.
- that councils urge that adequate mechanisms to ensure environmental protection be developed for projects not included in the assessment process.

Public involvement

that suitable programs of evaluative research be designed to assess the
effectiveness of existing public involvement programs in order to improve current
approaches and create new approaches where required.

Toxic chemicals

- that councils request their Ministers to recommend to the Canadian Council of Resource and Environment Ministers the establishment of a federal/provincial task force to initiate meetings with various federal and provincial regulatory agencies and representatives of the chemical industry, professional, scientific and consumer group organizations to consider
- a) what, if any, classes of toxic chemicals either presently in production or being developed require immediate restrictive action, and the timing of further restrictive actions;
- programs and necessary sources of funding for toxicology research and the development, on a coordinated basis involving government, universities, consumer groups and industry, of environmentally safe methods for the use of available chemicals; and
- c) means to develop and seek funding for educational and training programs to increase the numbers of environmental toxicologists and the awareness of Canadians regarding the inherent dangers of toxic compounds.
- that individual councils review existing legislation and regulations pertaining to the use and control of toxic chemicals within their respective jurisdictions and, where appropriate, press for the strengthening of these controls.

Agriculture and environment

- that individual councils urge their sponsoring environmental ministries to discuss, with respective Ministers of Agriculture, the problems arising from the impact of agricultural practices on the environment, and to ensure that extension and education programs developed for the agricultural community include information on good land use practices that reduce the impact of inappropriate agricultural operations on the environment.

The Environmental Advisory Council has been encouraged by the last two Ministers it has served to build closer relationships with the senior officers of Environment Canada, in order to contribute to the re-examination of the mandate and structure of the Department. Council submitted to the Minister, in early 1977, a report on the administrative and policy-making implications of environmental protection which stressed the need for an effective department to possess horizontal responsibilities in the coordination of federal activities which affect the environment. By invitation, Council members collaborated, in 1978, in a lengthy review of the Department's efforts to clarify its objectives, policies and operations.

Council has consistently been conscious of the need to become aware of environmental problems at first hand, and to this end arranged to hold one of its meetings, in 1977, in Fernie, British Columbia, where members met with representatives of

industry and government to view the impact of surface coal mining on the landscape and wildlife.

FUTURE ACTIVITIES

Council is continuing an examination of the problem of environmental toxicity; the northern environment vis-à-vis the role of Environment Canada; a review of the Environmental Assessment and Review Process; the assessment of risk in environment-related developments; jobs and the environment; wild lands management policy; and transboundary environmental problems.

PART B

THE STATE OF THE CANADIAN ENVIRONMENT

INTRODUCTION

Ian McTaggart-Cowan

Though it defies precise information, we have come to recognize our environment as an extremely complex system in which physical, biological and human factors interact in multitudinous ways to form the world in which we live. This system has a profound influence on our mental and physical wellbeing, on the lifestyle we choose to follow and on our economic success. Thus the environment is a very real human perception, consciously or otherwise, with the most desirable attributes differing for each individual. This is what makes decision-making in the area of environmental impact so difficult.

An environmentally minded society consciously attempts to carefully manage its environment so that it will survive as a desirable habitat for mankind, planning for the needs of all people and species, and not simply for the present generation. Such a society does not yet exist.

There are a number of reasons for our shortcomings as trustees of the environment:

- a) We have a strong bias towards short-term benefits to the neglect of long-term costs. Though it is technically feasible, for example, to process all human sewage through the third stage of treatment, removing all organic matter and precipitating out the remaining chemicals and minerals, this is expensive, and local communities weigh the cost of cleaning up their effluent against the alternative benefits their tax dollars can purchase in health care, policing, parks or education. All too frequently the decision is made to permit the water body to continue to degrade, sacrificing long-term advantages. Continued deferment of ameliorative procedures culminates in a situation which may have irreversible consequences.
- b) It is manifest that western society has developed ways of life and standards which cannot, or can only with difficulty or unacceptable expense, be maintained without environmental degradation. For example, human fallibility or the failure of our best technological design makes it certain that oil spills are unavoidable where oil is produced or transported in large quantities. We are only beginning to recognize the consequences of the discharge of sulphates into the atmosphere from the combustion of fossil fuels. The resultant precipitation is now known to be steadily acidifying thousands of square kilometres of lakes, leaving them unsuitable for many forms of aquatic life. The buffering effect of some soils compensates to some extent for the acid rain falling on land, but when these limits are exceeded, we can expect widespread deleterious effects on the terrestrial vegetation as well as on the water bodies.
- c) The success of our society in developing chemical solutions to challenging situations has led us to accept almost any claim of benefits to be derived from adding yet another chemical to our environment. The rate of this process leaves us incapable of examining and assessing the effect of any but a very small fraction of the new compounds we create each year. Our fixation on industrial progress has led to the irrational view that chemicals not specifically demonstrated to be harmful can be treated as if they were harmless and can be introduced into use with minimal regulation. This indiscriminate entry of toxics is almost unmanageable. A summary statement and recommendations concerning this problem is included in this Annual Review and an extended study will appear as a Council Report.

d) We are still ignorant of much of the complex nature of ecological systems and processes and thus we are unable to foresee many, even first generation, consequences arising from our actions.

The Canadian public is deeply disturbed about the state of the environment and indeed several polls have indicated that environment stands high among national concerns, following unemployment, inflation and crime. There are a number of ways of determining the level of public concern about specific issues. Developments with significant potential environmental change, as well as social and economic impacts, are subject to public scrutiny through the Environmental Assessment and Review Process. Canadians seldom resort to referenda, but a sequence of other forms of consultation are used. Letters or briefs addressed to the Minister, the interest and treatment in the public press, representations from citizen groups, which if ignored can lead to public confrontation and physical violence, are all of use in gauging the level of concern. Another means is access by a Minister of Environment to one or more advisory committees composed of informed citizens co-opted from a wide spectrum of experience. The Canadian Environmental Advisory Council is such a body.

The Council attempts to keep up to date on the changes that are taking place in the environment in all parts of Canada. Where it appears that the changes are likely to prove harmful to the total environment or parts of it, the Council attempts to define the problem and to develop a course of action which it can translate into advice to the Minister.

During the period covered by this Review, the Council undertook several studies wich are still in progress. One concerns an analysis of how federal policies and programs affect the management of habitat and renewable resources north of 60°, particularly in relation to the role of Environment Canada. A second study was designed to examine that element of the Canadian landscape known as "land in its natural state" or "wildlands". This is a subject of particular difficulty because wildlands are a common property resource and in our economic philosophy are often regarded as parts of Canada for which no useful purpose has yet been found. They are thus viewed as open to abuse or misuse by speculators despite their intrinsic value as a national heritage and a refuge for indigenous communities of plants or animals.*

Council has continued its concern to identify the influence of public interest groups on environmental policy. Meetings have been held with many of the major groups in Canada and with the provincial advisory councils, and an analysis of the situation is included in this Annual Review.

Canada's vast reserves of coal are becoming more attractive both for metallurgy and as a partial redress from increasing pressure on our supplies of oil and natural gas. Coal mining technology has changed extensively over the past decade and the Council took steps to inform itself about some of the impacts of open pit mining in the southern Rocky Mountains of Canada. The results of a visit to two mines and subsequent study of data regarding the effects on water and air quality and upon wildlife and recreational values are part of this Review.

^{*}The paper commissioned by Council as background for this study has been published separately: Canada's Wildlands, by J.G. Nelson, Working Paper No. 4, Faculty of Environmental Studies, University of Waterloo, Waterloo, 124 pp., 1979.

Council has maintained from its beginning a watching brief on the development of the Environmental Assessment and Review Process and has begun a critical review of its progress and effectiveness, with a view towards recommendations concerning its procedures and its relationship with Environment Canada.

This Introduction concludes with the sincere hope that the Department of Environment shares with Council a strong sense of urgency. Sobering analyses, supported in some case by alarming events, have recently confirmed what was originally only unsubstantiated suspicion that the state of the Canadian, and indeed the global environment, is in serious and imminent peril. We are defiling our environment beyond the limits of its tolerance, and a number of situations, reflecting what has been termed "technology out of control", have quite obviously outrun what we may have considered adequate measures of control. Those the Council have identified as the most critical are the consequences of acid rain, the dangers of marine oil spills, the effect of CO2 on climatic change, the proliferation of new chemical compounds and the disposal of toxic wastes. The prevention or amelioration of these hazards are beyond the capacity of individual action and demand the urgent attention of government agencies. This is no time for complacency. Solutions must be given the highest of priorities and those in positions of responsibility must acknowledge the seriousness of the environmental injuries and demonstrate that action is being taken.

ECOTOXICITY IN CANADA*

Donald A. Chant and Ross H. Hall

In contrast to classical toxicology, which is the study of the harmful effects of single chemicals on individual and populations of animals under controlled conditions, 'ecotoxicology is a discipline which studies the harmful effects of toxic agents and complexes of such agents on entire ecosystems. Ecotoxicity therefore is the impact of harmful substances on ecosystems, including, of course, their human inhabitants.

This disquietude about ecotoxicity, which gave rise to this report, arose from two major phenomena: rapid industrialization during an era of limited understanding of environmental impacts and of low public concern over environmental issues; and recognition of our ignorance of the biological and health significance of environmental degradation, which largely persists even today. The time lag between the arousal of environmental alarm and the accumulation of knowledge on which to base effective environmental protection can be very long indeed.

This concern was greatly heightened by analyses of the nature of what has been termed 'the chemical sea' in which we live. Some 1.8 million chemicals have been synthesized by man, of which 100,000 are in commercial use. Of these, more than 10,000 are at annual production levels greater than 100 lbs. and 9,000 in excess of one ton per year.

Production of synthetic chemicals increases by about 7% per year. In North America alone in 1977, 160 billion lbs. of synthetic organic chemicals were produced, of which vinyl chloride, widely suspected as being carcinogenic, constituted six billion lbs 1 .

New chemicals are synthesized at a rate of about 25,000 per year, about 500 each week². Of these, about eight per week are seriously considered for production, of which six actually reach production. Therefore, some 300 new chemicals appear on the market each year. If each of these were screened for possible environmental and health effects, a judgement would have to be made on one chemical every 29 hours. To adequately screen one chemical for health effects alone by present techniques requires two years of testing and costs an average of \$250,000. Simple tests for predicting the probable environmental effects of new chemicals have not yet been developed.

^{*}A summary of the major conclusions and recommendations contained in an internal report on "Ecotoxicity and the Chemical Sea", prepared for Council by the authors and approved in principle at a meeting of Council in September, 1978.

Most of these synthetic chemicals are new to nature, which consequently has had no time to evolve the benign mechanisms necessary to deal with them. In contrast, nature has evolved defensive mechanisms against naturally-occurring toxic substances at the concentrations which normally occur in nature.

As with synthetic chemicals, statistics with regard to the refinement and use of naturally occurring toxic substances show a substantial and continuing increase. For example, in the 25 year post-war period, the use of mercury for manufacturing chlorine, a good index of chemical production, increased 40 times. All of these chemicals, in some form, in some way, eventually end up in the environment. Unlike other forms of wastes, waste chemicals permeate uncontrollably all living processes, including humans. The fat tissue of all Canadians, for example, has become a rich repository for fat-soluble environmental contaminants, from pesticides and flame retardants to industrial transformer fluids, all of which integrate into the metabolism of our bodies.

When we broaden our focus from the human body to entire ecosystems, our apprehension becomes even more acute. The essence of ecosystems is constant transformation. Nothing is static in a living organism or in the ecosystem as a whole. One of our major misgivings is the way in which foreign, man-made chemicals invade the biotransformations of the ecosystems, becoming part of them. They move through the ecosystem in strange and unpredictable ways. For example, mercury, a naturally occurring metal, when discharged in unnatural amounts from industrial activities, is transformed by bottom-dwelling aquatic micro-organisms from its inert form to highly toxic methyl mercury which is soluble in water. As this substance moves up in food chains, it becomes even more highly toxic, to the point where fish are too poisonous to be used for human food. Many synthetic organic chemicals are known to move similarly through food chains, from the well-known pesticide DDT and its relatives to more recently known substances such as PCBs and PBBs.

The toxic effects of chemical contaminants often manifest themselves in subtle ways in the organisms that constitute ecosystems: diminished reproductive capacity, deformed offspring, loss of ability to learn, and the increased incidence of tumors, to name some. Our concern stems from recognition that human survival and well-being depend on the living ecosystem of which we are a part. And we must ask ourselves: if chemicals are having these effects on other species, what are they doing to us?

Synthetic chemicals cannot remain neutral in the living process: a given chemical is either a nutrient or a poison. In the absence of precise evidence to the contrary, we must assume that all synthetic chemicals are poisons which can modify, often irreversibly, the growth and life of all organisms. There is no other prudent course.

The problem for our society is that once a chemical enters the environment, it is impossible to control or contain. It is changed, accumulated, carried literally everywhere by water and air. It may interact synergistically, in ways almost completely unknown, with other contaminants and natural components of the ecosystem. It becomes integrated into the molecular processes of living organisms. At the moment, we have absolutely no laboratory approaches that can predict the fate and effects of a given chemical once released into the environment, let alone the fate and effects of complexes of chemicals. Moreover, we do not yet have a satisfactory system for monitoring these things in the natural environment.

Toxic chemicals enter our environment by three routes: by their deliberate use, such as for pest control; as wastes discharged incidental to some activity such as industrial production; and accidentally, such as the recent mixing of PBBs with cattle feed in Michigan, the release of dioxin into the atmosphere in Seveso, Italy, to avoid an explosion in a chemical plant, and the recent spill of PCBs in southern Ontario. Examples of chemicals entering the environment by these three routes are legion and well known.

The sharpening concern over environmental contamination by toxic chemicals has elevated a hitherto quiet and lacklustre science to international prominence and many new environmental policies are being based on it. That science is toxicology, and policies are being shaped on what toxicology is capable of doing. Unfortunately, traditional toxicology is not a good tool for uncovering or predicting the biological effects of chemicals.

The inadequacies of toxicology fall into four categories: 1) its methods of approach are based on the testing of single chemicals at relatively high dosages; 2) it has failed to develop animal models or other test systems capable of predicting the behaviour of chemicals in humans; 3) existing laboratory procedures are so labourious and time-consuming that only a few chemicals can be studied, and the cost is very high; and 4) toxicology is a laboratory science and offers little help in understanding the effects of toxic substances on the natural environment.

For one thing, traditional methods cannot determine the effects of extremely minute amounts of toxicants, either directly on health or on the ecosystem. And yet we know that very small amounts of some chemicals may have important effects. For example, diethyl stilbesterol, a chemical commercially fed to beef cattle, induced malignant tumors in laboratory mice at a level below the official analytical sensitivity of two parts per billion.

Furthermore, traditional toxicology cannot handle the element of *time*, especially when minute amounts of toxic chemicals are involved. And yet it is well known, for example, that many carcinogens do not cause cancer until 20 or more years after exposure. There may be similar time lags in the effects of toxic chemicals on ecosystems.

And finally, traditional toxicology cannot cope with determining and predicting the effects of *complexes of chemicals* on human health or on the assemblages of organisms that constitute ecosystems. We know, however, that we and our environment are exposed not to chemicals singly or in pairs, but in very large complexes in fact, the 'chemical sea'. And we know that these combinations of chemicals may have effects that far exceed the sum of their individual effects, through processes such as synergism where the presence of one chemical may greatly increase or modify the effect of another.

In dealing with environmental toxicity, two schools of thought have emerged. The first attempts to extend the methods and approaches of traditional toxicology to environmental problems. The second recognizes the inherent limitations of this science and is creating a new approach to the study of environmental problems - ecotoxicology.

Government legislation in the field of environmental contaminants is predicated on the first approach and is in danger of becoming as limited as the traditional science of toxicology.

Ecotoxicology, in direct contrast, deals with multicausal simultaneous effects of many substances, no matter how small the concentration, in the environment. The Scientific Committee on Problems of the Environment (SCOPE) has attempted to define an approach to ecotoxicology. Its project focusses on the living processes of the environment and it has defined six processes which can integrate the sum total of environmental effects³.

- Basic biological responses to toxic agents;
- Population influences of sublethal effects of toxic agents on individuals;
- Use of aquatic organisms for determining the effects of environmental contamination (toxic agents tend to end up in water systems);
- 4. Effects of toxic agents on plant communities and the identification of plant species that are particularly sensitive indicators of contamination;
- 5. Effects of toxic agents on soil micro-organisms;
- Study of geophysical systems: ozone, weather changes, global transport systems.

With traditional toxicology, humans conceptually remain separate from their natural environment and events in the environment cannot be related to their impacts on humans. With ecotoxicology, all living organisms, including humans, are treated as part of the system.

Attitudes towards environmental contamination can be separated into two perceptions. In the first, contamination is seen as incidental to chemical commerce. Pollution is a cost of using chemicals. This perception leads to a number of assumptions which are the base of present legislation: that contamination can be controlled at source; that traditional toxicology is a satisfactory base for making legislation; that some chemicals are more dangerous than others and should receive priority; that chemical contamination is inevitable and the best we can expect is to minimize its worst effects; that a certain amount of contamination can be tolerated provided that it is below a fancied "threshold" of harm; that humans are the centre of the biological world and the environment exists simply for us to use and enjoy.

In the second perception, the environment is viewed as a living ecosystem vulnerable to chemical intervention. Living organisms are the centre of attention and the objective becomes one of guiding the evolution of chemical usage so that it does not diminish environmental viability and quality.

If we had a strong scientific understanding of the ecological effects of toxic chemicals, it would be immaterial which perception prevailed because the scientific base for regulating chemicals would allow accurate and objective predictions of their effects. However, such is not the case, and with a grossly imperfect knowledge base, the perception within which environmental policy is shaped becomes all-important.

The Canadian Environmental Contaminants Act was proclaimed in 1976. It represents a major step in attempting to control chemical contamination of the environment. The Act empowers the Environmental Protection Service of the federal Department of Environment to ban or restrict the use, manufacture and importation of any chemicals, singly or by class. Clearly the Act is based on the state of the art in terms of what is known, or can be known, about the biological effects of chemicals. It places emphasis on the use of evidence of environmental toxicity: evidence of poisoned fish, plants or animals will be used as a basis for rules-making. Such retrospective use of data in effect uses the environment as a laboratory and carries with it the assumption that environmental contamination is safe and can be tolerated until firm evidence to the contrary is accumulated and actual harm can be demonstrated. As pointed out earlier, it also assumes that the traditional toxicological approach of testing single chemicals for their immediate lethal effects is a sufficient tool for the control of environmental contamination.

It is unrealistic to believe that environmental contamination can continue in its present manner with just a little modulation here and there. As welcome as some legislative initiative is in this area, we believe the *Environmental Contaminants Act* must be considered at best as first-generation legislation and that the urgent task now is to proceed immediately with the development of second-generation legislation based on the principles of ecotoxicology.

Our concern about chemical contamination of the environment and the attempts of the Department of Environment to deal with it fall into two categories:

- 1. The Environmental Protection Service lacks the resources to be able to administer the *Environmental Contaminants Act* effectively. The Department of Environment, and Canada as a whole, desperately lack the trained toxicologists, especially ecotoxicologists, required to test all chemicals suspected of having harmful environmental effects. There seems to be little time or resolve to develop a Canadian initiative in this regard.
- 2. We return to our notion of the two perceptions of environmental contamination. The present Act is based on the chemist's perception, whereas the next Act should be based on an ecological perception. Onus should be placed on those who would change the environment to prove that such change is harmless.

The next Act should be positive in the sense that it actively urges the seeking of alternative technologies to avoid chemical contamination. All forms of chemical production and use need to be examined from two points of view. First, can alternatives that minimize the use of chemicals be devised? Second, if chemicals must be produced and consumed, can it be done with the 'closed loop' approach? This is to say, in producing a chemical, methods for its disposal should be developed at the same time as methods for its production. Dumping chemicals in the environment, almost the only mode of disposal now used, cannot be tolerated any longer.

Lord Bertrand Russell wrote "One of the troubles of our age is that habits of thought cannot change as quickly as techniques, with the result that as skill increases, wisdom fades"⁴. Many decision-makers in the field of environment contamination will dismiss such wisdom as economically impractical at present and take the position that in any short term analysis perceived economic benefits must override environmental concerns. Perhaps one reason for this is that those who make policy and promote economic benefits see environmental concerns as being entirely negative -don't build this, don't use that. We would consider this report a failure if it leaves that impression. What we advocate are positive alternatives to present patterns of chemical use that are environmentally compatible. We are confident that everyone - citizen, industrialist, entrepreneur, politician wants to live in a stable, viable, healthy environment. We believe that the approaches we have proposed and the specific recommendations that follow will serve the interests of us all.

The Canadian public is becoming increasingly sensitive to chemical contamination of the environment. On the surface, some of the fears expressed may seem to be irrational or overly dramatic, but they represent serious and legitimate concerns, sometimes well ahead of those expressed by the government and the actions it takes.

The present study has convinced the Canadian Environmental Advisory Council that the situation regarding chemical contaminants in the Canadian environment is critical and demands the highest priority for action. Members of Council believe that the recommendations which follow are the minimum required and that they are within the resources and mandate of the Department of Environment and the federal government for implementation. If action is not prompt and incisive, the situation will deteriorate to the point where the government will be forced to declare a complete moratorium on the introduction of new chemicals and the widespread banning of existing chemicals. The economic and political consequences of such emergency measures would be severe. But concern over the health of all Canadians and the well-being of the Canadian environment may leave us with no alternative.

Recommendations

In the body of this report, a number of important aspects of the issue of toxic chemicals in the environment have been described:

- 1. Chemical technology is outstripping our knowledge and wisdom. All chemicals eventually end up in the environment, where they have the potential to cause harm to humans and to other species. More than 100,000 man-made chemicals are now in commercial use, and that number is increasing at a rate of about 300 per year. We know enough about a few hundreds of these chemicals to demonstrate serious harmful effects to the natural environment and to humans. About most, however, we know virtually nothing; most have never even been tested. Hence the concern of the Environmental Advisory Council.
- 2. Classical toxicology is unable to come to grips with the large number of chemicals now in our environment, and their complex interactions. There is a need to develop an expertise in ecotoxicology which can deal with problems of ecological and biological effects of phenomena such as long term exposure of humans and other animals to trace amounts of chemical complexes. The number of trained ecotoxicologists now available is grossly inadequate for the urgent jobs at hand.
- 3. The urgency and importance of the problems posed by the sea of chemicals now contaminating our environment, and the frightening rate at which their numbers are increasing, do not seem to be recognized fully by the federal government and other jurisdictions in Canada.
- 4. The federal legislative powers now in place, notably the *Environmental Contaminants Act*, do not seem adequate to meet the new realities of chemical contamination of the environment. Their philosophical bases are not attuned to these realities and their procedures are better adapted to coping with single chemical-single effect relationships than with the often subtle and indirect effects of chemical complexes, frequently in minute quantities acting over longer periods of exposure.
- 5. Canada has not been aggressive in pursuing the search for alternatives to chemicals on which we now rely so heavily, or in developing safer chemicals to replace some of the more hazardous ones now in use.

The Council believes that ecotoxicity is one of the most serious threats to human and environmental well-being now confronting Canadians. This conviction is supported by the Resolution on Toxic Chemicals formulated by the 3rd Joint Meeting of Environmental Advisory Councils (Appendix 1) held at Brudenell, P.E.I., in June 1978, and forwarded to the Canadian Council of Resource and Environmental Ministers (CCREM). It is on the basis of this widely shared concern that the Council has formulated its recommendations to the Minister of Environment. They are as follows, divided into three categories:

- A. Recommendations for action internal to the Department of Environment
- 1. A senior official of the Department, preferably an Assistant Deputy Minister, should be given responsibility for all Departmental activities and powers related to the control of the release of toxic chemicals into the environment.

- 2. An internal coordinating committee on toxic chemicals should be appointed under the leadership of the senior official referred to in Recommendation #1. This committee should be charged with the following responsibilities:
 - a) To coordinate within the Department all activities related to chemical contamination of the environment, including research, policy development, and regulations.
 - b) To coordinate the drafting of new legislation.
 - c) To coordinate the relations between the Department of Environment and the provincial authorities related to chemical contamination of the environment.
- 3. The Minister should initiate policy studies on the development of new, second-generation legislation more in tune with the realities of the sea of chemical contaminants in the environment and the concepts of ecotoxicity.
- 4. The Minister should give high priority to substantially increasing the work-years of effort in the Department allocated to the research support and administration of the present *Environmental Contaminants Act*. Moreover, we recommend a greater decentralization across Canada of the Department's activities related to the Act and that much more local field testing for chemical contaminants be carried out.
- 5. The Department of Environment should take the initiative in ensuring the rapid development of simple, quick and inexpensive testing procedures for determining the toxic effects of environmental contaminants, especially those suspected of carcinogenicity, mutagenicity and teratogenicity.
- 6. In implementing the *Environmental Contaminants Act*, and when developing second-generation legislation (see Recommendation #3), the Department should provide for the restriction or prohibition of the use of certain chemicals, classes of chemicals, and combinations of chemicals if there are reasonable grounds to suggest that such use is harmful to humans and/or the environment. We also recommend that the new legislation require the proponents of the use of a chemical to prove beyond reasonable doubt that the chemical will have no deleterious effect, immediately or in the forseeable future, on the environment and/or human wellbeing.
- 7. To facilitate research on and understanding of ecotoxicity as widely as possible, we recommend that all toxicological and analytical data held by the federal government, or submitted to it by industry to support the use of a chemical, be in the public domain. This freedom of access should also apply to statistics on amounts in use.

- B. Recommendations for action by the federal government
- 8. An interdepartmental coordinating committee should be established under the leadership of the Department of Environment, and with representatives of other interested departments and agencies, to be responsible for all aspects of chemical contamination of the environment. This committee should be empowered to coordinate environmental monitoring research, policy development and the development and application of legislation. It should also coordinate federal-provincial relationships with regard to chemical contaminations.

Jurisdictional responsibilities for environmental contaminants understandably are assigned to a number of federal departments and agencies. It is essential, however, that there be one centre of responsibility that transcends the other departments and agencies in these matters and has the authority to coordinate their efforts. We recommend that the Department of Environment be assigned this central role.

The interdepartmental coordinating committee should be the focal point, in concert with the Department of External Affairs, for developing and expressing Canada's international interests in ecotoxicity and for interacting with international agencies such as WHO, FAO, OECD, and UNEP active in the field of chemical contamination.

- 9. The Department of Environment should give leadership in persuading the federal government and Canadian society as a whole to adopt a longer time frame and broader perspective in attempting to resolve apparent conflicts between perceived economic benefits and environmental well-being, particularly with respect to the use of chemicals which are harmful to the environment.
- C. Recommendations for action external to the federal government
- 10. The Minister of Environment should take the initiative among his appropriate colleagues in enabling one or more major government-university centres in ecotoxicity to be established without delay. These centres would provide a focus for collaborative research on ecotoxicology between government and university scientists to maximize the national effort and at the same time provide a suitable milieu in which the universities can train the ecotoxicologists Canada so badly needs.
- 11. The Minister of Environment should take leadership in encouraging Canadians to embark on an aggressive search for economic, industrial and biological alternatives to the use of chemicals which contaminate the environment. When the use of chemicals that contaminate the environment is essential, Canadians should be encouraged to apply the closed-loop philosophy wherein methods for the safe and effective ultimate disposal of all chemicals produced becomes an integral part of their production, use and management.

REFERENCES

- ¹ Storck, W.J. "Production rises for most major chemicals", *Chemical and Engineering News*, May 1, 1978, pp. 32-37.
- ² Hamilton, R.D. *Aquatic Environmental Quarterly: Toxicology*. Fisheries Research Board of Canada Report No. 13, Ottawa, 1976, pp. 1-18.
- 3 Environmental Issues 1976. Scientific Committee on Problems of the Environment (SCOPE) of the International Council of Scientific Unions (ICSU), August, 1976.
- 4 Quoted by John A. Knowles in *Doing Better and Feeling Worse*, Norton, N.Y., 1977.

APPENDIX I

THIRD JOINT MEETING OF ENVIRONMENTAL ADVISORY COUNCILS

BRUDENELL, P.E.I., JUNE 4-7 1978

RESOLUTION

TOXIC CHEMICALS

Due to the extreme importance of potential harmful effects of various chemicals on the environment, the advisory councils recommend:

- 1. That participating councils request their respective Ministers to recommend to the Canadian Council of Environment and Resource Ministers the establishment of a federal/provincial Task Force to initiate meetings with various federal and provincial regulatory agencies and representatives of the chemical industry, professional, scientific and consumer group organizations, to consider, among other issues
 - a) what, if any, classes of toxic chemicals either presently in production or being developed require immediate restrictive action, and the timing of further restrictive actions;
 - b) programs and necessary sources of funding for toxicology research and the development - on a coordinated basis involving government, universities, consumer groups and industry - of environmentally safe methods for the use of available chemicals; and
 - c) means to develop and seek funding for educational and training programs to increase the numbers of environmental toxicologists and the awareness of Canadians regarding the inherent dangers of toxic compounds.
- 2. That individual councils review existing legislation and regulations pertaining to the use and control of toxic chemicals within their respective jurisdictions and, where appropriate, press for the strengthening of these controls.

COAL MINING AND ENVIRONMENTAL MANAGEMENT IN THE FERNIE AREA OF BRITISH COLUMBIA

Ian McTaggart Cowan

Coal has been mined in the Crowsnest Pass area of British Columbia and Alberta for more than a century. Indeed, the presence of abundant, easily accessible, high quality coal played an important part in the decision of the Canadian Pacific Railway to build a railway into the Fernie Basin by 1898. The towns of Natal, Michel, Fernie, Hosmer, Coal Creek and Morrissey were mining communities distributed along the railway and operating coal mines in the mountains flanking the main valleys of the Pass. The demand for coal was high. It was the major fuel for domestic heating and cooking, the basis of the coal gas distribution systems of Victoria and Vancouver and the fuel used by all railroad locomotives of the day. By 1910 about 8,000 men worked the mines and lived along the valley, and coal production reached a peak of 1.3 million tons. The mining was by conventional underground techniques and called extensively upon the adjacent forests for timber.

Changing economic conditions and a new energy technology based upon oil gradually eroded the demand for coal until by 1959 total British Columbia production was only 850,000 tons. Homes and mines were deserted, the coke ovens at Coal Creek, Morrissey and Hosmer were dilapidated ruins, the valley was a depressing scene of tumbledown buildings, rusting equipment and piles of coal waste.

Mining in the first half of the 20th century paid little attention to its environmental impact, and though underground mining caused relatively little surface disturbance, over the years large piles of discarded rubble accumulated adjacent to the tunnel portals and the cleaning plants. Little attempt was made to control or reduce the erosion of silt or of chemical leachate from the rubble piles, several of which intruded into the Elk River, which ran gray throughout the flood period. Though some of the erosion was natural, uncounted tons of silt from the mines were swept downstream and into the Kootenay River.

The region north and south of the main valley leading to Crowsnest Pass is unlike any other in British Columbia. The Kootenay, Bull, Palliser, Elk, Fording and Flathead Rivers and their tributaries traverse wide valleys flanked by mountains rising to 10,000 feet. Most of these valleys were heavily timbered with spruce, with Lodgepole Pine predominating at the mid to upper forested altitude, Douglas Fir, Western Larch and Ponderosa Pine in the Rocky Mountain Trench and on the lower slopes of the Front Range.

Extensive forest fires swept many of the side valleys during the later years of the coal mining era, prior to the 1950s. The western and southern mountain slopes, even before the fires, featured widely scattered subalpine grasslands and open forests on steep slopes where there was a rich understory of forbs and grasses. These were some of the finest big game winter ranges in British Columbia. True, the big game populations fluctuated widely in numbers largely in response to the severity of the winters as they were reflected in snow depth and the persistence of snow pack. Elk (wapiti) were almost exterminated by very severe winters in the years 1870 to 1885. Deforestation and fire greatly increased the area of suitable winter range for the ungulates and they prospered. The area gained world renown for its big game hunting.

All the rivers provided trout fishing from good to excellent as viewed by the relatively small number of fishermen who penetrated on foot or by horseback into the more remote areas.

The area had the common feature of all subalpine-alpine habitats of the Canadian west: the productive areas were small, the standing crop of both game and fish was small in numbers or poundage. Management of the resource was almost non-existent and the persistence of its recreational quality depended upon its inaccessibility and consequent use by relatively few people. The residents in the southern Rocky Mountain Trench and along the Crowsnest Pass participated extensively in hunting, fishing, and wilderness camping and treasured these opportunities. With improved transportation to the population centres of the province, hunters and fishermen flocked in from other parts of the province.

There are no figures to provide a useful measure of the state of the wildlife resource as it was prior to the 1960s. Indeed we can find no objective measurements as to the numbers of wintering wildlife using any of the winter ranges that have now been extensively altered. Similarly we have been unable to find any measurements of the total fish yield of the Fording River prior to recent environmental changes nor of such adjacent rivers as the Bull or Palliser which could provide comparative data. Our inquiry for measurements of stream bottom organisms in any of the rivers before and after the recent changes has been equally fruitless.

The early 1960s saw a renewed interest in the coal deposits of the Crowsnest Pass area. This time the demand was for metallurgical coal largely for export to serve the burgeoning steel industry of Japan. Coleman, already in active production, was the first to export to Japan. Kaiser Resources Limited revitalized the industry and purchased much of the freehold land of the Crows Nest Pass Coal Company. A contract was signed calling for delivery of 75 million tons of metallurgical coal over a period of 15 years. This is an important source of employment and of contribution to the Canadian balance of trade. In addition, it became increasingly clear in the early 1970s that Canada could no longer meet its major energy requirements from petroleum and hydro electricity. The abundant coal was seen as having great and increasing importance in Canadian energy and chemical futures. The metallurgical coal market led companies to expand their interest in coal potential; exploration was active and several new mines were brought into production. Notable among these are Fording and Byron Creek Collieries while others are in early stages of exploration or development.

The mine of Fording Coal is situated in the valley of the Fording River in one of the most important wildlife and fisheries areas of the region. Elsewhere, Sage Creek Coal Company is planning a mine on Sage Creek, an influent of the Flathead River in another rich wildlife and fisheries area which crosses the International Boundary into some choice recreational lands in the State of Montana. Inevitably, controversy has developed between those concerned with the mining of coal and those who see in the advent of a mine the destruction of the wilderness values they treasure (Warden, 1976).

One of the most important attitudinal changes in our society during the past quarter century has come about from a general awakening to the integrated nature of the environment and to the dynamic relationships which link its components. As Roots (1977) has put it: "No matter how beneficial for our own desired purposes the principal intended results of our activities may be, our actions are bound to cause effects additional to the principal effects we have in mind. Such additional or unintended effects may not be to our advantage." This is particularly pertinent to our extraction of resources from wild lands. It is further complicated because the immediate benefits usually accrue to different people than do the disbenefits. "One obvious characteristic of mines in British Columbia,

compared with most other pollution producing industries, is that mines are usually located in a setting of relatively unspoiled nature. The contrast between the mine itself, its dump, mill and newly constructed town, and the wooded valley or otherwise unscarred mountainside is always there for all to see. A generation ago, this isolated outpost of industry, winning wealth from untapped nature, was looked on as a symbol of man's ingenuity and as a proud demonstration of progress toward an ever expanding better future. Now it is looked on by some, perhaps by an increasing number, ... as a forerunner of the destruction of the environment which supports us and of which we are a part" (Roots, 1977).

In the twenty years between the virtual disappearance of coal mining in the Fernie district and its rebirth in the 1960s, there had occurred a revolution in mining technology. Changed economic circumstances, and radically new technology dependent upon megamachines made it possible and economically desirable to change from conventional underground mining of the coal to open pit mining of the deposits available from the surface. The new techniques called for the translocation of millions of tons of waste material in order to expose and remove relatively small bodies of coal. The comparatively small waste piles from underground mining became mountains of rock and earth removed in the open pit process. This has greatly complicated the environmental problem associated with the mining of coal in the mountainous areas of the southern Canadian Rockies. There had always been a problem of waste disposal where mines were on mountain sides, and the easiest disposal of wastes was to let gravity take them downhill. But downhill always led to a stream or river which was not only a valuable resource itself but also served to distribute water borne pollution through areas far removed from the mine. This problem now became orders of magnitude greater.

The social response to the ever broadening concern to undertake the extraction of our natural resources in ways that will minimize long term disbenefits to other values has evolved steadily and has diversified as it did so. Steady pressure from citizen organizations such as the British Columbia Wildlife Federation, the Federation of British Columbia Naturalists and the provincial branch of the Sierra Club, to name just a few, has emphasized the importance placed by them upon the maintenance of wilderness, wildlife and fishery resources during the processes associated with the opening, operation and close out of mines. The provincial government professional staffs in fish and wildlife management, water management, forest management and their federal counterparts, where they are involved, are now providing a data base of varying adequacy which will be useful to determine future trends, and a presence representing the orientation, expectation and legislated requirements of their responsibilities. The provincial Ministry of Energy, Mines & Petroleum Resources has been part of the reorientation of attitudes and enacted the earliest legislation providing for conservation and rehabilitation as part of the mining process (B.C. Coal Mines Regulation Act, 1969). More recently the provincial Environment and Land Use Committee issued its Guidelines for Coal Development (1976) which provided expanded and much more detailed expression to the requirements that would be an integral part of all aspects of coal mining from exploration to the production and transport of the product.

One of the intrinsic problems of managing the impact of a mine upon the total environment within which it operates is that there is no choice as to location. A mine must develop where the coal deposit exists. It is theoretically possible to reach a decision not to develop a known and economically viable mineral resource because of other land values. To our knowledge such a decision in Canada has been made rarely and then only in national parks. Thus the mitigation of impact rests with the management of processes and with the restoration of land-scapes to a form and biota which will be as little damaging as possible to other landscape and resource values.

The coal mining companies themselves have been sensitive to the public view of their activities and have devoted a steadily increased effort to mitigation of their environmental impact and especially to the subsequent restoration of the disturbed land.

In recognition of the extensive environmental changes engendered by the mining of coal in the mountainous areas of British Columbia and Alberta, the Canadian Environmental Advisory Council, in October 1977, visited the mines operated by Kaiser Resources Limited and Fording Coal Limited. Our purpose was to view at first hand two operating mines known to be experimenting with a variety of techniques to limit the damage done to other resource values and to restore mined-over land to wildlife and recreational use.

We were shown the mining process in all phases and discussed with mine officials and with representatives of the provincial Fish and Wildlife Branch and the Environment and Land Use Secretariat, the problems, successes and failures in the efforts to minimize the amount and consequences of environmental changes induced by the mines and to subsequently restore the mined-over area to an approximation of its pre-mining state and function. Individuals in the Ministry of Energy, Mines & Petroleum Resources provided helpful advice.

We were able to gain a general impression of the changes that are inescapable when an open pit mine is developed in this type of landscape. We examined the procedures being undertaken to limit the destructive changes and to encourage the regrowth of vegetation on areas subsequent to the removal of the coal.

The acreage altered is extensive. Fording Coal straddles the Fording River and has now disturbed some 3700 acres of land. About 700 acres had been treated for revegetation at the time of our visit. Two open pits, Clode and Greenhills, are on opposite sides of the valley. An underground mine is planned on the east flank. The narrowness of the valley has led to problems in the disposal of the water used for washing the coal, with its contained fines, as well as for handling the silt-charged runoff from the exposed slopes. In 1972, Fording came into production and since 1973 has produced from two to three million tonnes of clean coal per year. Kaiser Resources was working a traditional underground mine, an underground hydraulic mine and a complex of three open pit mines on Harmer Ridge involving an acreage we did not determine. Workings reach an altitude of 7000' or slightly more.

There is no escape from the conclusion that the discovery and development of mines such as we saw permanently changes the character of the area involved. One of the most important aspects of the change is not the result of the mine per se, but of the increased access which results from the building of a road, and the introduction of many more people into an area. This aspect of environmental change would be much the same if the magnet were timber removal, mining or a major recreational development. Wilderness landscapes are inevitably altered by the introduction of large numbers of people and machines. The degree to which the addition of people has profound effects on wildlife and fisheries depends upon the management of the human activities. Over-fishing, the introduction of pollutants into the water, or inept road building will reduce the fish stocks available; over-killing of wildlife or disturbance of wintering wildlife on winter ranges will lead to declines in wildlife populations. There is evidence that some species withdraw from areas where they experience frequent contact with people.

In this area of British Columbia the first roads up most of the valleys were built to serve the forest industry, thus this part of the process of environmental change was well advanced before mine development began. The advent of a coal mine, however, introduces a new level of activity. A railroad spur is commonly built to transport the coal, the number of people involved and the activity generated is many times that required for timber removal though the area affected is much less. The impacts on the esthetic environment as on the biota are both altered in kind and increased in severity.

Changes occasioned by mining begin with the intensive exploration required to determine the potential for a mine. The coal deposit must be identified as to area, volume and position. Samples must be obtained to determine chemical and physical characteristics, and this involves the use of drilling equipment which must be moved throughout the area. This in turn demands rough roadways, formerly constructed without the concern for stream integrity that would be required of a more permanent road. Warden (1976) gives figures of six acres of disturbed land per mile of incline with less than 30 slope and 11 acres per mile where slopes exceed that. Stanlake et al (1975) gives 12 acres per mile as the area disturbed by exploration roads.

Then comes the mine itself and to quote from a publication of the British Columbia Wildlife Federation:

"The effects of surface mining are undeniable. Environmental disturbance at an open pit site is obvious, and invariably and inevitably severe. While the mine operates there is a progressive loss of vegetative cover, directly removing one essential element of habitat for ungulates and, in one way or another, affecting all wildlife. Degradation of a watershed begins with that first step. Next the top soil is removed, it might be stockpiled for later replacement; often it is not. Next, in the Kootenays, shale and sandstone usually have to be drilled and explosives set to break up the rock. The rubble is then put in a dump away from the surface being mined. Much of the overburden material has never before been exposed to the elements and ... dissolved minerals and chemicals leached from the waste dumps can be carried into watercourses ... Physically the unconsolidated spoil piles may be unstable, resulting in slides, and steep exposed slopes are easily eroded. Sediments find their way into water courses where they smother the bottom growth and insect life and silt-in spawning beds" (Warden, 1976).

This is a worst case summary which indicates most of the categories of impact that are of concern to those whose responsibility it is to keep environmental impacts to a minimum, to reduce the time and area over which they apply and to expedite restoration. Recognition of these and other potentially harmful impacts led to major efforts by the Ministry of Energy, Mines & Petroleum Resources and the mining companies to reduce the immediate impacts and to restore the mined-over land to a useful vegetative cover. Detailed Guidelines for Coal and Mineral Exploration, focusing attention on environmental damage, have been prepared by the Ministry which also has in draft stage a comprehensive Handbook of Environmental Protection and Reclamation in Coal Exploration. The changes in philosophy and in practice over the past three years have been important.

The impacts which have been observed in the coal mining areas of the southern Canadian Rockies can be categorized as

a) disturbance, referring to the consequences of intrusion by men and machines;

- the removal of plant cover with its impact on the plant-eating fauna, as well as upon the esthetic appeal of the landscape and its surface integrity;
- c) physical alteration of stream courses incidental to road building (culverts, training) and the diversion required in the construction of silt containment ponds;
- d) silt erosion from devegetated slopes and spoil piles into watercourses with consequent alteration to the productivity of the aquatic biota; also water-borne coal fines entering the natural drainage;
- e) chemical leaching of soluble resident or oxidized minerals;
- f) the physical displacement of wildlife and other users of the land area occupied by the mine and associated developments such as roads and railroads, settling ponds, parking areas, etc.:
- g) increased access to fish stocks and wildlife populations
 previously protected by inaccessibility with consequent
 increased pressure on the stocks;
- some reduction in air quality as a result of airborne dust and stack effluents.

These categories of impacts are widely recognized by both the mining industry and the provincial departments responsible for the management of the extraction of minerals and of the management of fish and wildlife and of recreation. Indeed, planning of mining procedures to keep environmental change to a minimum and the design and implementation of reclamation procedures to quickly restore mined-over land to its former use are now major preoccupations of both the Ministry of Energy, Mines & Petroleum Resources and the mining companies. In 1977 and 1978, major symposia took place on the reclamation of lands disturbed by mining. The Proceedings of these conferences include a wide variety of papers and discussions of technical, experimental and experiential nature, much of them related directly to the area we visited.

As a result of our visit to the coal mining area, our discussions with those directing mining operations, including the environmental officers at the mines, and with federal and provincial officials responsible for the management of the environment, the members of the Canadian Environmental Advisory Council became aware of examples of each of these areas of impact. We also witnessed serious, costly attempts being made at both the mines visited to reduce the overall impact of mining on the environment through the life of the mine. The brevity of the visit precluded more than a superficial on-site view of the changes and the results of mitigative and restorative activities. We summarize these as follows:

a) Disturbance. As has been stated, disturbance is an unavoidable result of introducing people and machines into areas previously without them. Disturbance means many things, among them the introduction of sights and sounds foreign to the area. These affect the enjoyment of people whose use of the area depends upon its wildness and naturalness. On the other hand, new access may open the region to people with neither the physical ability or the wish to enter on foot. There are more of them, so benefit and disbenefit depend in part on the definition of ideal and the opinion of the user. The mechanical activity along a transportation route can be detrimental to the enjoyment of the environment by more categories of recreational users.

The impact of disturbance on wildlife is more varied and its detail is known only in part. Many species of wildlife will adapt to noise and the movement of machines provided that the disturbance effect is not reinforced by hunting or similar harassment or by contact with various forms of noisy off-road vehicles. The problem then becomes a matter of the management of human activity, including hunting and fishing, in the newly opened region. Within the mining property this is the task of the mine, and at both Fording and Kaiser, wildlife is strictly protected within the area under company control. Indeed, discharge of firearms on any mining property is considered hazardous and is forbidden. Protection of wildlife is a secondary benefit. We saw both deer and elk and can vouch for their tranquility in the presence of people. Off the mine site, the responsibility rests with provincial agencies. We have no evidence as to how well it is being met.

b) Removal of Plant Cover. On both mine sites removal was complete. Over a large surrounding area, clean-cut removal of forests had been practiced so that the area of visible devastation was extensive, though not all of it may be related to mining. We were informed that there is a working cycle of three to five years in this type of mining, from the beginning of removal of the overburden through the mining and transport of the coal to the beginning of revegetation. At both mines, we were told that the objective is to attain a situation in which the area revegetated annually equalled that newly divested of its topsoil. Kaiser Resources officials informed us that they were approaching that balance. Fording was just entering the seeding process.

Experiments in revegetation have been proceeding for nine years. The primary motivation for restoring a vegetal cover is to reduce surface erosion. A secondary purpose is to begin the process of returning the mined-over land to use by wildlife and for recreation.

There is a modest literature reporting on these reclamation activities. Ziembiewicz (1977) reviews some of the research by Kaiser Resources since 1975. Hubbard and Bell (1977) provide an extensive review of techniques of reclamation appropriate to British Columbia mining areas including an annotated list of plant species which have been tested. Laut (1975), Popowich (1978) and Milligan and Berdusco (1977, 1978) have published detailed descriptions of the techniques developed at Fording Coal and at Kaiser Resources for preparing the large spoil piles and other mine wastes for effective reclamation.

The techniques in use are applied from the first design of the mining operation and reclamation purposes are said to be introduced at the earliest planning stage (Hathorn & McQueen, 1978). Selection of the sites for spoil piles, the use of wraparound dumping to improve stability of slopes, the purposeful distribution of materials of different degrees of fineness so as to introduce stability, the reworking of spoil piles to 27 or less, and the preparation of the seed bed are all parts of the process. It has been found necessary to fertilize either from a ground vehicle or a helicopter before seeding directly or in a slurry of peat and fertilizer and mulching with wood chips. We viewed slopes at all stages from seed bed preparation to those with five years of regrowth.

Several decisions are required during the revegetation phase of land reclamation and restoration. Angle of slope has been mentioned. The physical nature of the seed bed is also critical. Dark coloured slopes containing a lot of coal fines absorb heat and on south— and west-facing slopes may reach temperatures lethal to some species of seedling plants. On other exposures the absorbed heat may be beneficial to some plants. Surface texture is also important and it has been found that, on some exposures, a rough surface which provides micro-shadow areas encourages better survival of young plants. Harrison (1977) suggests several other ways of reducing soil temperature during summer maxima.

The mines visited had together tested the suitability of about 50 species of grasses and forbs potentially useful in restoring a vegetative cover to the disturbed areas. For some species, a six year history of success and failure in germination survival was available.

Though it is the announced intention of both mines to restore the wildlife ranges to at least their original carrying capacity, a first objective has been to establish a vegetation of any sort which can begin to reduce the erosion of surface material. It has been decided to concentrate on developing a pasture type vegetation cover and to permit the succession to proceed from there using natural processes. Several different seed combinations have been tried along with a variety of fertilizing regimes. The Ministry of Energy, Mines & Petroleum Resources has also established plots to test seeding rates. Almost all seed has been of "domestic" species, largely because of seed availability, but Kaiser Resources is now engaged in an experimental collection and testing of the growth conditions required by at least ten species of shrubs and trees.

The most productive species tested by Kaiser Resources have been: alfalfa, crested wheat grass, smooth brome orchardgrass, red fescue, perennial rye grass, intermediate rye grass and some of the clovers. In contrast the species of range plants selected in greatest quantity by wildlife on the rangelands were bluebunch wheat grass, rough fescue, a variety of forbs and several shrubs, including serviceberry, dogbane, silver sage brush and spirea (Hebert, 1973).

Observation of the growth of vegetation on a newly exposed moraine has revealed that more than a century is required before the soil has built up a humus horizon which will support trees. Obviously the goal of rehabilitating mined areas is to greatly shorten the period of revegetation. This is done by manipulation of the restored soil and by the use of fertilizers annually applied by surface machine or by helicopter. Current opinion is that in some areas fertilizing will have to be continued for 10 years for the vegetation to become self-maintaining. We examined five year old regrowth which was dense and lush even in October. Plant cover varied from site to site. In some areas of more active surface or inhospitable substrata, coverage was low. In the better areas it was up to 95%.

At Sparwood, we saw a small nursery plot producing some shrubs and tree species for testing. We saw White-bark Pines which had been planted on one high ridge, but the planting was too recent to provide evidence of likely success. At Kaiser Resources, trees are being planted to form coppices in suitable areas (Milligan & Berdusco, 1978).

There is no doubt that the new, heavily fertilized pasture is attractive to both deer and elk. We saw both species feeding on the revegetated slopes. It should be understood that the soft pasture grasses and forbs used so far are not the equivalent of the native species. The latter were shown by Hebert (1973) to cure into natural standing hay with a high protein content. It is this, along with the nutritious shrubby vegetation of the wild rangelands, that give them their high carrying capacity. No doubt native species will invade, but there may be an optimum stocking level for introduced plants which maximizes invasion by native vegetation.

Certainly, the present restored vegetation has none of the species found by Hebert (1973) to provide the late winter feed of bighorn on the slopes he studied. It would be surprising if the revegetated slope contribute much winter feed. Only studies of the phenology of spring "green-up" will provide data on their contribution to the credited early spring feed of big game.

c) Physical alteration of water courses. The requirements for the design and placement of culverts, the criteria that govern choices between culverts and bridges and the placement and design of bridges so as to maintain stream flow suitable for fish are well known. We did not examine the effluent rivers for evidence of siltation or of chemical changes in stream water through input of leachate from spoil piles.

A major stream entrainment had been recently completed at Fording Coal. This had arisen as the consequence of the need to construct a much larger settling pond. To secure the space, the stream course had to be diverted across the valley. The new channel had been built to a design calculated to maintain suitability for fish (Wood, 1978). At sensitive points the bank was sheathed with stone rip-rap. The stream bed was gravelled and large boulders placed so as to create eddies and begin the natural process of stream bed sculpturing. The plan was designed on the basis of earlier successful diversions by the same consultants as part of salmon enhancement programs. The success of the diversion will only be measureable over the next few years. The productivity of the original river is evinced by the seining of about 10,000 trout from the part of the river to be abandoned. These were replaced into other parts of the river. There is doubt that the food resources of the receiving areas would be adequate to support the added population.

We have been unable to find any measurements of the impact of either of the mines we visited on the downstream environment. The local impression is that the fishing had declined since "the early days". If true, this could mean several things:

overfishing as a result of increased access, maintenance of about the same productivity but now divided among many more fishermen, a result of spawning bed siltation, or chemical alteration of the water by mine effluents. It is surprising that the required research has not been done. Even management sampling in a systematic way would produce useful data.

d) Erosion and siltation. It is inevitable that exposed soils on steep slopes will erode as a natural process. However, the disturbance of mining can greatly accelerate erosion. All spoil piles of fine textured materials showed rill channels. There has been continuing trouble with erosion and slumping of the piles of debris which Kaiser Resources inherited from the Crowsnest Industries era. We were told of major slumping of such piles on several recent occasions leading to extensive entry of silt into the Elk River.

It follows that a major concern in the prevention of water pollution is the interception of all runoff and its diversion into settling ponds. We did not see the arrangements at Kaiser Resources. At Fording Coal, at the time of our visit, the settling pond was only partly filled with water and the steady flow of water through the natural filter bed of the pond bottom and walls was emerging cleaned of sediment. A pond immediately below the settling pond contained a number of trout which seemed normally active.

The Water Investigations Branch of the British Columbia Ministry of Environment has published extensive accounts of its studies of water quality above and below the two mines we visited. They found sediments from mining caused high turbidity and suspended solids in the Fording River at the minesite and for some distance downstream, especially during spring runoff. They also report a high nitrate content immediately downstream from the mine, probably due to the use of ammonium nitrate explosives. The reports indicate that the sediment load had a measureable effect upon the benthic invertebrate communities, including greater instability of populations.

In commenting upon the impact of this water pollution on fish, they state: "The fish population of the Fording River is dependent on benthic invertebrates for food. During freshet, and until the bottom is recolonized, these portions of the river will probably not support a fishery. In addition, there were fewer kinds of invertebrates at the sites where black, fine sediment had accumulated. This may reduce the fishery..." (B.C. Water Investigation Branch, 1976 b).

Much the same situation was reported for the Elk River below the site of Kaiser Resources activity. In this river, however, it was difficult to separate the water pollution arising from the mine from that of other sources of pollution, such as roads and residences.

e) Chemical leaching. The coals of the southeast area of British Columbia are low in sulphur and less likely to generate the acid runoff which has been an important source of environmental damage in other parts of North America. None the less, it is unlikely that the water filtering through the spoil piles or emerging from the coal washers is chemically unchanged from that previously entering the valley-bottom rivers. Whether the changes, if they exist, have altered the biological productivity of the streams is unknown. Harrison (1977) found that mining increased total dissolved solids, total alkalinity, total hardness, iron and sulphate contents but it is not known if these changes are deleterious to fish. The most important environmental concern is the suspended solids.

f) Physical displacement of wildlife. There is no doubt that this has taken place along the main traffic routes of the Fording valley. It occurred long ago along the main route to Crowsnest Pass when mining was only of incidental importance. Stanlake et al. (1976) showed that the exploration roads had little effect on the movement patterns of wildlife in the area. It is not the physical presence of the road, but the movement of traffic along the road, along with shooting at the animals, which causes the disturbance.

We have no evidence as to the extent of displacement of sheep or elk from winter range subalpine grasslands. Populations of these species have decreased generally throughout the East Kootenay region where there are mines as well as where there are roads but no mines. Thus even the observation of present absence would not establish the fact.

- g) Increased access leading to overharvesting. This can be linked to the last discussion. There appear to be no measurements of the extent of increased hunting or fishing in the area since the mines were developed, and thus it is impossible to make valid statements on this potential impact. If there has been overkill, this is a management problem intrinsic in increasing access.
- h) Airborne pollution. Studies by the British Columbia Ministry of Environment have demonstrated some changes in air quality as a consequence of the coal mining activity in the Elk Valley (B.C. Water Investigation Branch, 1978a). Average levels were within recognized standards though under some circumstances the standards were exceeded.

The quality changes are primarily the result of particulate matter and includes that from the stack and the coal drier as well as airborne dust which arises from the activity of mining, handling and transporting coal and also from wind lifted dust from the exposed spoil piles. One large source of particulate and other contaminant matter in the air was the coke-ovens where the equipment is stated to be obsolete and results in airborne pollution difficult to control. The region experiences periodic temperature inversions which exacerbate the inconvenience and discomfort from air pollution.

It was difficult for the monitoring team to separate the sources of the airborne contaminants and dust, but a strike at Kaiser Resources from mid-May to mid-July 1976 provided one opportunity. There were marked reductions in the amount of airborne dust and other contaminants during the period.

Because of the low sulphur content, the sulphation rate was found to be quite low. The report states that "sulphur dioxide in the region is unlikely to affect vegetation or create a health problem".

Conclusions. Open pit mining as it is practised in the coal deposits of the southeastern parts of British Columbia undoubtedly results in changes to the landscape, some of which can be described as 'geological' in scale. Even though the acreage actually disturbed by the mining is a relatively small part of the total area, on site the changes are massive and the reclamation task is daunting. The Council was impressed with the progress already achieved in restoring the waste piles to a revegetated condition attractive to wildlife. It was convinced also of the serious dedication of the mining companies to accomplishing reclamation. It is certain that the research in progress and the trials being developed will lead to further improvements. These will not only produce a more satisfactory end result but may well reduce the costs involved. Not all problems have yet been overcome.

The impact of mining development in an area is only in part from the mine per se. Alteration of wildlife populations results as much from the increased access and the increase in the number of people entering the area and the variety of new forms of disturbance. These require new levels of activity, an improved information base and more sophisticated management on the part of all branches of government, provincial and federal, entrusted with the management of our renewable resources. It is apparent that some of these agencies are not provided with resources adequate to the new tasks.

Experience shows that effective management of the changes imposed by mining in a wildland area depends on the collective efforts of several groups: an alert, informed public; officials of government agencies dedicated to reduction of impacts to a minimum; and company staff at a fairly senior level charged with impact management and reclamation. There is no substitute for the on-site presence of a company reclamation officer, and for regular monitoring by mining inspectors and professional field staff from agencies responsible for fish and wildlife resources. Together they can identify problems and develop or apply solutions.

We found a general lack of basic information as to the pre-mining productivity of the area for both fish and wildlife. As well, we could not obtain objective measurements of the present state of wildlife and fish stocks in the area.

Recommendations

- 1. We recommend that, as a general practice, before a new area is opened to mining, there be a detailed inventory to develop the basic data against which changes can be measured and against which the success of reclamation and restoration can be assessed.
- 2. In view of the complexity of the socioeconomic and biological problems involved when new mining areas are opened, we recommend that there be a planning mechanism involving the agencies of the provincial and federal governments concerned. We further recommend that the agencies responsible for management of the renewable resources be funded and staffed to meet the new demands.
- 3. We recommend that as far as possible, native plant species be used as the basis for the revegetative process. This may require the encouragement of private production of seed.

4. We recommend that in the planning of mining and disposal of waste, including prior removal of forests, provision be made, where feasible, to leave 'islands' and 'corridors' of trees to serve as winter cover for wildlife. We further recommend that emphasis be placed on techniques for restoring trees and shrubs to reclaimed land.

REFERENCES

British Columbia, Environment and Land Use Committee. Guidelines for coal development. Victoria, 1976, 33 pp.

British Columbia, Mines & Petroleum Resources. Guidelines for coal and mineral exploration. Victoria, 1977, 61 pp.

British Columbia, Water Investigation Branch. Kootenay air and water quality study. Phase I - Air quality in Region A: the Fording-Sparwood-Fernie area. Victoria, 1976a, 81 pp.

British Columbia, Water Investigation Branch. Kootenay air and water quality study. Phase I - Water quality in Region 2: the Elk River Basin. Victoria, 1976b, 139 pp.

British Columbia, Water Investigation Branch. Kootenay air and water quality study. Phase II: Air quality in the Elkford-Sparwood-Fernie region. Victoria, 1978a, 93 pp.

British Columbia, Water Investigation Branch. Kootenay air and water quality study. Phase II - Water quality in the Elk and Flathead River Basins. Victoria, 1978b, 289 pp.

Fording Coal Ltd. Annual reclamation report for 1977 and proposed program for 1978. Operation & Surface Work Permit No. 3, 1978, 107 pp., xerox.

Harrison, J.E. Coal mining and surface water quality: Crow's Nest Pass, Alberta and British Columbia - preliminary data. *Geol. Surv. Can. Paper 77-1A*, Ottawa, 1977, pp. 319-322.

Harrison, J.E. Summer soil temperature as a factor in revegetation of coal mine waste. *Geol. Surv. Can. Paper 77-1A*, Ottawa, 1977, pp. 329-333.

Hathorn, F.G. & D.K. McQueen. Reclamation planning at Hat Creek, B.C. In: Reclamation of lands disturbed by mining. Proc. 2nd Ann. B.C. Mine Reclamation Symposium, 1978, pp. 109-131.

Hebert, D.M. Altitudinal migration as a factor in the nutrition of Bighorn Sheep. Ph.D. thesis, Univ. British Columbia, Vancouver, 1973, 355 pp.

Hubbard, W.F. & M.A.M. Bell. Reclamation of lands disturbed by mining in mountainous and northern areas. Biocon Research Ltd., Victoria, 1977, 251 pp.

Kaiser Resources Ltd. Environmental Services Dept. Annual reclamation report for 1977 and proposed program for 1978. Sparwood Operation & Surface Work Permit No. 2, 1978, 44 pp., xerox.

Laut, J. Site preparation method employed at Coleman Collieries Ltd. In: Reclamation of lands disturbed by mining. Proc. 2nd Ann. B.C. Mine Reclamation Symposium, 1978, pp. 159-166.

Milligan, A.W. & R.J. Berdusco. Reclamation problems at high elevations. *In:* Reclamation of lands disturbed by mining. *Proc. B.C. Mine Reclamation Symposium*, 1977, pp. 11-24.

Milligan, A.W. & R.J. Berdusco. Waste dumps - design, contouring and vegetation at Kaiser Resources Ltd. operations. *In:* Reclamation of lands disturbed by mining. *Proc. 2nd Ann. B.C. Mine Reclamation Symposium*, 1978, pp. 185-195.

Peck, R. Summary of impacts of coal mining on fish and wildlife resources in the East Kootenay. 1975, 42 pp., xerox.

Popowich, J. Spoil dump resloping at Fording River operations. In: Reclamation of lands disturbed by mining. Proc. 2nd Ann. B.C. Mine Reclamation Symposium, 1978, pp. 167-184.

Roots, E.F. Mining, environment and control. *In: Practical application of economic incentive to the control of pollution*. Ed. J.B. Stephenson, University of British Columbia Press, 1977, pp. 83-104.

Stanlake, M.G., E.A. Stanlake & D.S. Eastman. Coal exploration activities and their effect on subalpine winter ranges in southeastern British Columbia. B.C. Fish & Wildlife Branch, Wildlife Management Report 13, 1975, 30 pp.

Thirgood, J.V. The rehabilitation of the mining environment in British Columbia. Can. Inst. of Mining & Metallurgy, Québec, 1971, 14 pp., mimeo.

Warden, G. Black pits and vanishing hills. British Columbia Wildlife Federation, 1976, 39 pp.

Wood, J.A. Fording River diversion. In: Reclamation of lands disturbed by mining. Proc. 2nd Ann. B.C. Mine Reclamation Symposium, 1978, pp. 97-107.

Ziemkiewicz, P.F. A comprehensive reclamation research program on coal mining disturbed lands. *In:* Reclamation of lands disturbed by mining. *Proc. B.C. Mine Reclamation Symposium*, 1977, pp. 119-131.

THE INFLUENCE OF NON-GOVERNMENTAL AGENCIES ON ENVIRONMENTAL POLICY

Philippe Garigue

For some years the Canadian Environmental Advisory Council has been trying to clarify the relationship between public opinion and policy-making at the federal level of government in Canada. To do so, it has examined how the public defines and expresses its views, and how these views are incorporated into policy-making. Council has concluded that there exists a diversity of views, reflecting the pluralistic nature of the Canadian population. It has also examined how these pluralistic messages are transmitted to the federal government and how different groups of the Canadian population react to the decisions of the federal government in environmental matters.

After some preliminary study, Council determined that there exists a significant gap between this diversity of attitude and the ability of the federal government to develop policies required to reflect both this diversity and the essential national priorities. This gap is the result of various causes, including the size of our country, the existence of different levels of political responsibility for policy-making, the lack of information on environmental questions available to the citizenry, and the extreme variety of messages originating from the public. Also contributing to this problem is the lack of a nation-wide network of representative associations which can readily assess or coordinate the wide range of public attitudes about environmental affairs. While a federation of the numerous associations concerned with environmental matters is not the only way to provide for an adequate flow of information between the public and the federal decision-makers, the Council concluded that a national assembly of environmental public interest groups has an important role to play in the development of environmental policy. Accordingly, Council has attached a high priority to the study of how this might be most effectively accomplished.

The rationale of Council relationship with environmental groups

Hundreds of groups interested in environmental matters exist in Canada, ranging from local Chambers of Commerce to professional associations. While recognizing that each of these groups has a legitimate interest in the protection of the environment, Council has taken as the starting point of its evaluation the activities of those groups which have the furthering of environmental quality as the basic reason for their existence. This reduced the number of groups to be considered and demonstrated that few of them are involved in the overall development of environmental policy. The great majority of environmental groups are local associations focusing on a single project, whose action is limited to the municipal or at most the provincial level of government. There are therefore few well-structured national associations with a permanent staff and a capacity to speak for a significant segment of the Canadian population in the shaping of a national policy.

Nevertheless, Council also recognized that, whatever the size, representativeness or the resources possessed by these groups, it is their activities which have been the major instrument of public opinion, and which have induced the provincial and federal governments to create Departments of the Environment. Their political influence was to a large extent the result of their ability to formulate action reflecting legitimate interests of various segments of the population. However,

the pluralistic tendency they display has made it difficult for them to unite to propose common solutions to problems, and has resulted in a failure to participate in the development of a general policy. Their preoccupation with a wide range of projects has precluded any effective impact on setting overall priorities or general environmental trends, especially with regard to policy statements.

To counteract the present tendency towards fragmentation in the selection of national priorities, deliberate steps must be taken to increase the contribution of non-governmental organizations to the orientation of national policies. There is need for a greater ability among associations to represent the plurality of opinion of the Canadian population, and to develop the kind of organization which offers opportunity for selecting those national priorities in environmental policy which represent the common good of Canadians. This implies that they must develop a capacity to influence environmental policy-making at the federal level. This development must also be seen as the growth of an organizational pattern which can effectively serve those ends and influence the main thrust of such policies aimed at meeting the requirements of the various ecosystems of Canada. As these ecosystem requirements are the "real" boundaries of policy-making, the deficiency in public opinion representation by interest groups becomes a major weakness in policy-making.

The strengthening of nationally-oriented environmental organizations is based on the principle that the free association of Canadians in groups permits the development of common interests and their application to the selection of national priorities. The divergence of opinions regarding approaches to the promotion of environmental quality can thus be compensated by organizational action.

The weaknesses of the public interest groups in Canada

The available information on voluntary associations in Canada is highly deficient. Not only is it difficult to know how many or what kind of associations there are, but their representativeness is extremely difficult to assess. The available evidence, showing a rapid turn-over in membership and in leadership, makes it possible to conclude that in Canada environmental groups are more of a social movement than permanent "pressure groups". Furthermore, in some instances, because of the small membership of certain associations, they are more the instruments of a few leaders who are disproportionately active, than true associations of persons representing large segments of the population.

In the present context of Canada, it is difficult to describe in simple terms a representative "environmental non-governmental organization" or its activities. It is this very diversity which explains the preoccupation with certain environmental problems, and at the same time the tendency toward fragmentation, specific project interest and the lack of coordination in planning for environmental quality. By their tactics of striving for project orientation and immediate ends, the groups have often provoked resistance to overall solutions to national problems.

These weaknesses appear to be the result of an absence of an overall structure which would permit a coordinated approach to national activities, which are, because they demand a certain level of resources, frequently beyond the capabilities of most voluntary associations. The most significant weaknesses of environmental groups may be stated as follows:

 i) an absence of permanent staff, weakening competence or knowledge as well as the level of activities;

- ii) an absence of contact between associations, limiting the range of collaboration;
- iii) difficulties in obtaining relevant information or services for documentation of problems faced by the membership;
- iv) unreasonable reliance on energy, time and funds volunteered by their most dedicated members;
- v) difficulty in developing activities in fields which are dominated by controversial or even purely economic interests, where solutions demand protracted research.

Since these limits determine their potential, it is not surprising that environmental associations, although motivated by high ideals, have achieved only modest objectives. The public interest groups will only be able to serve truly national goals if they are able to develop to higher levels of competence, through attracting the requisite resources, developing the necessary knowledge and achieving collaboration between all associations towards the selection of common priorities for presentation at the federal level of government.

Action taken by the Environmental Advisory Council

In examining how the voluntary associations could be encouraged and helped to make a more effective contribution to environmental policy-making, Council was guided by a clear statement of intent: how to relate the interests of the Canadian public to the responsibilities of the Department of Environment so as to secure the priorities and orientations needed for a national policy. 'Members of Council were in agreement that such a goal could not be achieved unless the public interest groups were strengthened in their ability to communicate public opinion to the policy-makers. Accordingly, in 1975, the Council recommended to the Minister of Environment that voluntary associations should receive financial support. Though this recommendation was accepted by the Minister, it could not be implemented at that time owing to budget restrictions.

Because of this delay, Council then examined the possibility of itself becoming a link in the relationship between the groups and the Department of Environment. To this end, two meetings, in March and November 1977, were held with representative groups with interests in environmental matters.* These meetings were extremely valuable in clarifying the situation for both the voluntary associations and the Council, and in establishing a foundation for collaboration.

The first meeting was organized to provide an opportunity for the Council members to become better acquainted with the problems and goals of the public interest groups, and to evaluate the ways by which Council could most effectively insert the opinions of the Canadian public into the policy-making process of the government. The agenda for this meeting included an evaluation of public participation in environmental decision-making, the provision of information, the legal standing of environmental issues, the public funding of non-governmental organizations, and an examination of specific environmental problems. The voluntary associations presented a number of resolutions to be studied later by the Council.

^{*} Reports of the first and second meetings of public interest groups with the Canadian Environmental Advisory Council, Report No. 7, 1978.

The participating groups decided at this first meeting to establish a steering committee to effect continuing liaison with the Council and to plan the agenda for a further meeting.

The second meeting was opened by the Honourable Len Marchand, who had recently been appointed Minister of State (Environment). Mr. Marchand expressed a conviction that voluntary associations had a fundamental role to play in both shaping public opinion and transmitting that opinion to the government. He was also in agreement that some ways should be found to support them from public funds. The agenda of the meeting included a review of action from the first meeting, the changing role of public interest groups in Canada and the resources available to them, and a discussion of certain environmental issues pertaining to the energy policy and especially the nuclear power policy of the federal government.

Council considered these meetings as having been most valuable in determining its relationship with the environmental public interest groups, and resulted in Council setting itself three objectives:

- to examine the matter of continuing collaboration to facilitate the flow of information;
- ii) to identify the most effective way for the public interest groups to develop new direct relationships with officials of the Department of Environment, to give encouragement to the groups to act in an autonomous manner;
- iii) to evaluate how the public interest groups can contribute most harmoniously to the growth of efficiency in policy-making and to changes in attitudes and behaviour of the Canadian population which would be beneficial to the maintenance and enhancement of environmental quality.

These questions are under discussions by the voluntary associations steering committee and will be the subject of study by the Council. A third meeting is contemplated, which would focus on specific points of environmental policy formulation, and would examine a number of position papers produced by the environmental associations. It is hoped that these may give rise to recommendations to the Minister.*

Conclusion

The development of environmental non-governmental organizations in Canada has become one of the priorities accepted by the Canadian Environmental Advisory Council, as an essential ingredient in the growth of a national policy on environmental questions at the federal level. It is its conclusion that a fundamental role can be played by the public interest groups if they possess more resources and a better structured organization. It is also the conviction of the Council that these groups perform important functions for the Canadian public. Significant weaknesses have been identified and Council has urged the groups to examine critically how they must overcome their deficiencies to permit them to achieve influence in policy-making. To this end, the Council is prepared to continue to assist them to assume the role of which they are capable.

A Third meeting was held in November, 1978, a report of which will be issued in 1979.



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Annual Review 1979-1980



A DECADE OF ENVIRONMENTAL CONCERN:
RETROSPECT AND PROSPECT

ENVIRONMENTAL ASSESSMENT AND REVIEW PROCESS:
OBSERVATIONS AND RECOMMENDATIONS



Canadian Environmental Advisory Council

Annual Review 1979-1980

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Environment Canada Ottawa, Ontario KlA 0H3

Canadian Environmental Conseil consultatif Advisory Council

canadien de l'environnement

December 31, 1981

The Minister Department of Environment Ottawa Ontario

Dear Mr. Minister:

We are pleased to transmit to you this report of the Canadian Environmental Advisory Council for the period 1979-1980.

As with its predecessors, this report contains a record of Council's activities over the period covered, and includes the recommendations resulting from the fourth and fifth meetings with the provincial environmental advisory councils.

Following the general report on activities, which includes a revised statement of the role of the Council, is a commentary on the recent history of environmental concern in Canada and a review of the Environmental Assessment and Review Process.

In publishing this Annual Review, it is Council's intent to make some of our concerns about the environment known to the interested public of Canada, and to continue to bring to your attention the recommendations arising from our discussions and reviews.

Yours sincerely,

D.A. Chant Chairman

T. Beck Vice-Chairman R. Bergeron Vice-Chairman

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council was established in 1972 by decision of the federal Cabinet, to advise the Minister of the Environment on:

- such matters as may specifically be referred to it by the Minister;
- · the state of the environment and threats to it;
- the priorities for action by the federal government or by the federal government jointly with the provinces;
- the effectiveness of activities of the Department of the Environment in restoring, preserving or enhancing the quality of the environment.

The Council is composed of up to sixteen members who serve in an individual capacity and are drawn from a wide cross-section of Canadian life and from all across Canada. Officials of the Department of the Environment are not members of the Council; however the Department provides a continuing Secretariat.

To carry out its functions the Council undertakes studies and reviews of matters of environmental concern and policy, holds regular meetings to consider progress and developments with regard to these concerns, and prepares comments, statements and reports as appropriate. The Council publishes an *Annual Review* which includes a summary of the state of the environment in Canada, and from time to time reports on other matters of general interest and importance.

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary Canadian Environmental Advisory Council c/o Department of the Environment Ottawa, Canada K1A OH2

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LIST OF PUBLICATIONS

Annual Review 1973-1974. Part A - Activities 1973-1974 by Arthur Porter. Part B - Problems and Priorities in the Canadian Environment by Pierre Dansereau.

Annual Review 1975. Part Λ - Activities 1975 by Ian McTaggart-Cowan. Part B - Significant Canadian Environmental Problems by J.P. Nowlan.

Annual Review 1976. Part A - Activities 1976. Part B - The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A - Activities 1977-1978. Part B - The State of the Canadian Environment.

An Environmental Impact Assessment Process for Canada. Council Report No. 1, February 1974.

An Environmental Ethic - Its Formulation and Implications. Council Report No. 2, January 1975. By Norman H. Morse.

Harmony and Disorder in the Canadian Environment. Occasional Paper No. 1. By Pierre Dansereau. Council Report No. 3, 1975.

Environmental Aspects of Nuclear Power Development in Canada. Occasional Paper No. 2. By H.E. Duckworth, H.W. Duckworth, Arthur Porter and J.S. Rogers. Council Report No. 4, 1977.

Towards an Environmental Ethic, March 1977. By D.A. Chant.

Report of the Second Joint Meeting of Environmental Advisory Councils. May 1977, Fort San, Saskatchewan. Council Report No. 5, March 1978. Produced in collaboration with the Saskatchewan Environmental Advisory Council.

The Management of Estuarine Resources in Canada. Council Report No. 6, March 1978. By Irving K. Fox and J.P. Nowlan.

Reports of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council. Council Report No. 7, May 1978.

Ecotoxicity: Responsibilities and Opportunities. Council Report No. 8, August 1979. By Ross H. Hall and Donald A. Chant.

Report of a Meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Council Report No. 9, April 1981.

A New Approach to Pest Control In Canada. Council Report No. 10, July 1981. By Ross H. Hall.

ACTIVITIES 1979-1980

MEETINGS

In 1979, Council held six full meetings, all in Ottawa except for one meeting at the University of Toronto and one in Winnipeg at the time of the annual assembly with provincial councils. The executive committee met on four occasions and participated in a special meeting in November between the Minister and representatives of environmental groups.

In 1980, seven meetings took place, four in Ottawa and one each in Québec, St. Andrews and Calgary. The executive met four times, twice in Toronto, once in Ottawa and once in Edmonton.

MEMBERSHIP

Dr. D.A. Chant was appointed chairman in October 1979, succeeding Dr. I. McTaggart-Cowan who retired from the Council. Dr. R.B. Bergeron and Mr. T. Beck were appointed as vice-chairmen, and Dr. P. Garigue, reappointed for another year as an ordinary member, retired in October 1980. Dr. D. Ahanekew resigned from the Council in October 1979, Ms. M.J. Loveys in March 1980 and Mr. R. Brown in July 1980. Four new members joined Council in October 1980: Professor A.R. Lucas, Ms. N. MacPherson, Dr. P.F.M. McLoughlin and Dr. P. Meincke. Dr. R.H. Hall was reappointed for a term of two years. The affiliations of the members are listed on page ii.

ACTIVITIES

Council called on a number of officials of the Department of Environment to attend meetings to discuss topics of interest: Mr. H.L. Ferguson, Dr. J.D. McTaggart-Cowan, Dr. H. Martin, Dr. G. McBean, Mr. G.E. Wells and Mr. M. Rivers regarding long range transport of airborne pollutants, in particular the problem of acidic precipitation; Mr. B. Felske concerning socio-economic impact analysis; Dr. J.S. Maini and Mr. R. Lawford on departmental science policy; Mr. M. McConnell on the activities of the Canadian Council of Resource and Environment Ministers; Mr. J.W. Maxwell on the environmental aspects of recreation and tourism; Mr. C.A. Lewis, Mr. R.H. Weir and Dr. J.D. Kingham on offshore developments; Dr. P.M. Bird on the nuclear policy inquiry; Mr. A.T. Davidson on parks policy; Mr. T. Lash on ecological reserves; Mr. P. Wilson on transboundary issues; Dr. J. Fitzpatrick on environmental indicators; Dr. D.R. Redmond on forestry policy; Dr. J.S. Tener, Mr. W. Brackel and Mr. C.S. Lewis on the role of the Department in the North; Mr. R. Taillon on the James Bay and Northern Québec Agreement; Mr. J. Klenavic, Mr. J. Herity and Mr. C.D. Robertson on the revision of the FEARO terms of reference; and Dr. J.E. Brydon on environmental protection policy. Mr. Roger Simmons, parliamentary assistant to the Minister of Environment, attended a meeting on behalf of the Minister.

Dr. H. Harvey, University of Toronto, contributed to the discussion of the effects of acidic precipitation on Ontario lakes and Dr. M. Ruel, Indian & Northern Affairs, on ecological reserves. Dr. A.L. Hamilton, International Joint Commission, reviewed a number of boundary water issues, and Dr. T.L. Perry of Vancouver sought Council's support regarding the Skagit Valley controversy. Ms. B. Olivastri, National Survival Institute, briefed Council on recent activities of the public interest groups. Mr. E.R. Bushett, Economic Resources Conservation Board of Alberta, and Mr. A.D. Crerar, Environmental Council of Alberta, described the activities of their organizations. Mr. A. New and Mr. R. Doyle, Secretary of State Department, were invited to explain the funding policies of the Assistance to Community Groups Program.

To continue and extend the relationship between Council and the Department, the Regional Directors-General were invited as the occasion permitted to attend and participate in several meetings. Members of Council also attended regional board meetings in Québec, Ontario and the Northern & Western Regions.

In November 1979, after discussions with representatives of public interest groups, officials of concerned federal departments, provincial and territorial officials, industrial organizations and the Canadian Environmental Law Association, Council submitted a review of the Environmental Assessment and Review Process (EARP) to the Minister. The full text of this report is contained in this Annual Review. Council is maintaining its interest in the development of EARP and the Federal Environmental Assessment and Review Office (FEARO).

Council Report No. 8, Ecotoxicity: Responsibilities and Opportunities, which was summarized in the 1977-78 Annual Review, appeared in December 1979. Council has underway substantive studies on pesticides in the environment and on the management of wildlife resources in the North, both of which are intended for publication.

Recommendations, critiques or expressions of concern were transmitted to the Minister in 1979 and 1980 on a range of topics which included federal forestry policy; the impact of foreign aid projects; the Skagit valley issue; the parliamentary inquiry on nuclear power; Polar Bear Pass ecological site on Bathurst Island; environmental aspects of the Dempster Highway; the Toxic Chemicals Management Plan; response to tanker spills; the impact of certain mining developments; science policy in Environment Canada; Kluane Park development; Alaska Highway gas pipeline environmental considerations; the uncontrolled slaughter of northern caribou; ecological reserves; the role of Environment Canada in the North; public participation policy; long range transport of acidic pollutants; and environmental protection policy.

Council is maintaining its interest in science policy in the Department of the Environment, the role of the Department in northern Canada, the management of national parks, forestry policy and continues to urge action concerning the establishment of ecological reserves.

In Jume 1980, the fourth assembly of environmental public interest groups was organized by Council. The Proceedings of this meeting will be published by the Council. Eleven briefs on selected issues (public participation, pesticides management, hazardous substances, forestry management, wildlife, water quality, energy, acid precipitation, nuclear wastes, urban environment, international affairs and financing of public interest groups) were presented to the Minister of Environment. The Canadian Environmental Advisory Council has consistently taken the position that it should not be perceived as the only or indeed the major point of contact between the interest groups and the Department. It took the initiative in facilitating contact among the groups and provided financial support for the first four meetings. Concurrent with the development of a broader policy of public participation, the Department has agreed to take responsibility for organizing future meetings of this kind.

The Chairman and Vice-Chairman (Dr. Bergeron) visited Washington to confer with members of the US Council on Environmental Quality, where issues of common interest were discussed, in particular the problem of acid rain and the regulation of offshore hydrocarbon development. The Chairman participated in the process of selection of a new executive chairman of the Federal Environmental Assessment Review Office.

MEETINGS OF ENVIRONMENTAL ADVISORY COUNCILS

The meeting organized through the initiative of the Canadian Environmental Advisory Council in 1975 which brought together representatives of the various environmental advisory bodies in the provinces has become established as an annual assembly. In June 1979, the Manitoba Environmental Council hosted the third such assembly at Hecla Island on Lake Winnipeg. A year later, the councils met at St. Andrews, New Brunswick, at the invitation of the Environmental Council of New Brunswick.

It has been the practice of these assemblies to review their activities, successes and failures and to address matters of mutual environmental concern. At the second meeting, held in Saskatchewan, a number of resolutions on matters of environmental consequence were developed, and forwarded to the Canadian Council of Resource and Environment Ministers, in the expectation that they would be considered worthy of serious attention, having been endorsed by a nation-wide group of concerned environmental advisors. These resolutions are also taken back to the respective councils for discussion and endorsement and eventual forwarding to the individual ministers. Subsequent meetings have all produced resolutions or recommendations of this kind.

At Hecla Island, in 1979, the agenda dealt primarily with the problem of hazardous wastes. In 1980, at St. Andrews, the topics addressed were long range transport of atmospheric pollutants, shore zone management, land use, and ecological reserves. Participants agreed that the following resolutions would be brought before the constituent councils, and if ratified (perhaps with modifications depending on local circumstances), would be forwarded to the councils' respective ministers.

RESOLUTIONS OF THE FOURTH MEETING OF ENVIRONMENTAL ADVISORY COUNCILS

Resolution I - Federal/Provincial Relationships

That the Councils'should endorse the stated Environmental Protection Service Policy to maintain and strengthen interprovincial and international cooperation;

That the Councils should accept the need for federal/provincial interaction and agreement with emphasis on the following jurisdictional areas:

Provincial - manufacture, sale, use and disposal of hazardous materials

It is understood that any provincial jurisdiction has the right to impose more stringent regulations if it so desires.

Resolution II - Research and Professional Training

In contrast to classical toxicology, which is the study of the harmful effects of single chemicals on individual and populations of animals under controlled conditions, ecotoxicology is a discipline which studies the harmful effects of toxic agents and complexes of such agents on entire ecosystems.

In order to increase the number of trained toxicologists and ecotoxicologists, the Councils should:

- a) urge granting agencies to provide substantially greater funding for training and research in toxicology;
- urge provincial governments to recognize that toxicology and ecotoxicology are important subjects for advanced study;
- c) urge Canadian universities to recognize ecotoxicology as a discipline in its own right, and give appropriate attention to this discipline;
- d) urge that priority be given to the establishment of centres for research, testing and dissemination of information in the field of ecotoxicology.

Resolution III - Public Education

That Councils urge that educational programs on the selection, safe handling, use, and disposal of hazardous materials should be given a high priority.

Resolution IV - Financing of Long Term Disposal of Hazardous Wastes

That an environmental protection fund should be established, involving the federal and provincial governments and those industries concerned with hazardous wastes, to provide for the financing of hazardous wastes disposal where the originator cannot be identified or can no longer be held responsible.

Resolution V - Incentives

That governments should consider appropriate financial incentives and penalties to assure proper evaluation of the environmental consequences of domestically produced and imported toxic substances.

Resolution VI - Monitoring of Toxic Substances

That the scope and governmental monitoring of hazardous materials should be extended in order to secure adequate baseline data.

Resolution VII - Introduction of New Chemicals

That more stringent regulations should be placed on the introduction of new chemicals into the environment, with the burden of proof of their acceptability in the environment, within specified limits, to be placed on the manufacturers; and that governments, at the appropriate levels, should develop suitable mechanisms for monitoring company data.

Resolution VIII - Environmental Impact Assessment

That environmental impact assessment procedures should be extended to include any government program involving a potential hazardous material.

Resolution IX - Master List of Toxic Chemicals

That the federal and provincial governments should consider the desirability of establishing a master list of toxic chemicals, their acceptable concentrations, manufacture, handling and disposal.

Resolution X - Review of Legislation by Councils

That Councils should review the present status of legislation in their respective jurisdictions with respect to the following recommendations:

- a) that there should be an obligation to specify, by regulation, toxic chemicals and their maximum permissable concentration in the environment;
- that where this is not yet stated policy, a specific time limit should be established for arriving at such regulation;
- c) that maximum concentrations should be established from the most conservative approach possible, given present technology, and that such criteria should be reviewed on a regular basis to ascertain if they can be lowered;
- d) that there should be a legal obligation on the provincial control agencies to take immediate action when hazards arise.

Resolutions XI - Acid Precipitation

Because of the demonstrated ongoing chemical change of Canadian water bodies and vegetation due to long range airborne pollution, the Councils should urge that federal and provincial governments, acting in concert, take immediate steps to determine the magnitude of the problem and means to ameliorate the situation on a national and international basis.

Resolution XII - Freedom of Information

It was agreed that Councils should consider the federal council's recommendations on toxicity in general, and in particular the endorsement of recommendation A-7 on freedom of information.

Recommendation A-7 states:

"To facilitate research on and understanding of ecotoxicity as widely as possible, we recommend that all toxicological and analytical data held by the federal government, or submitted to it by industry to support the use of a chemical, be in the public domain. This freedom of access should also apply to statistics on amounts in use".

In 1980, at St. Andrews, two workshops produced recommendations concerning shore zone management and long range transport of atmospheric pollutants (acid rain). An additional topic addressed by some of the participants resulted in resolutions regarding ecological reserves.

A third workshop, on *land use practices*, resulted in a thoughtful discussion paper, but the assembly considered that the subject was too complex to do justice to in the time available, and recommended that the councils study it and report their conclusions at the next meeting. Nevertheless, the session unanimously endorsed the statements that land use practices have important effects on the environment and therefore Ministers of the Environment have some responsibility to ensure that good land use is practised.

RECOMMENDATIONS OF THE FIFTH MEETING OF ENVIRONMENTAL ADVISORY COUNCILS

Shore Zone Management

The Joint Canadian Environmental Advisory Councils go on record as strongly supporting the principles of Shore Zone Management agreed to by the Canadian Council of Resource and Environment Ministers (CCREM).*

The Canadian Environmental Advisory Councils recognize that the imminent production of off-shore oil and gas necessitates a system of short (exploration) and long term shore zone planning that will minimize adverse environmental effects.

In carrying forth the principles endorsed by the CCREM we recommend that priority be given to the following areas of concern:

- a) Identification of renewable and non-renewable resources which could be adversely affected;
- b) The necessity for relevant basic and applied research;
- c) The development of appropriate physical and institutional models;
- d) The identification of sensitive ecological areas within shore zones:
- The necessity of environmental impact study for any significant project;
- f) The development of appropriate public information programs.

The implementation of the foregoing necessitates a close cooperation amongst all levels of involved governments.

^{*}Shore Management Symposium Proceedings, Canadian Council of Resource and Environment Ministers, April 1980.

Long Range Transport of Atmospheric Pollutants

The joint meeting of Canadian Environmental Councils, having examined and considered the subject of Long Range Transport of Atmospheric Pollutants (LRTAP) find that:

- Acid precipitation is a serious international and inter-jurisdictional problem which is threatening to increase rapidly due to conversion to higher sulphur fuels;
- 2. Irreversible damage to aquatic resources and serious health impairment, both due to atmospheric sulphur, are well documented;
- 3. Progress is being made in the knowledge of atmospheric chemistry and transmission of sulphur compounds. However, little is yet known about the behaviour of nitrogen oxides, or of the organic and inorganic air contaminants such as PCBs, dioxin, mercury, etc;
- 4. Effective control of these emissions requires formal agreements between jurisdictions. Although the International Joint Commission is involved in air pollution as it affects transboundary waters, the issue far outreaches its present mandate, and there appears at present to be neither international nor federal/provincial frameworks appropriate for such control; and
- 5. The solution of the problem will require a systematic approach combining accelerated research, reduction of emissions and the application of ameliorative techniques;

and therefore we recommend that all Ministers of the Environment:

- Urge the Government of Canada to increase its efforts towards conclusion of a treaty with the United States for correction and control of our mutual problems of LRTAP;
- b) Urge their own governments to pursue intergovernmental collaboration and be prepared to enter into an interjurisdictional arrangement;
- Urge their own governments to accelerate education and research in atmospheric chemistry and the effects of airborne pollutants; and
- d) Examine the alternatives available for mitigating the effects of past airborne pollution.

Ecological Reserves

It was resolved:

- a) That the joint councils request the Federal Minister of the Environment to pursue vigorously the creation of Ecological Reserves on appropriate federal lands throughout Canada;
- b) That the Joint Councils request the Canadian Environmental Advisory Council to pursue with the Federal Minister of the Environment that his Department support a National Ecological Reserves Coordinating Committee. The committee would function as a clearing house for information on ecological reserves in Canada.

Land Use Workshop Committee Report

The working group on Land Use considers that the most important point for Councils to emphasize is that land use practices are central elements in environmental issues and therefore, the achievement and maintenance of good land use practices are important responsibilities of Environment Ministers and authorities.

Principles

The working group established some general statements of principle that lie behind actions that Councils can take in this area:

- 1. Proper land use maintains a balanced and healthy ecosystem;
- Good land use, over time, is sound economics and profitable sustained resource use; and
- 3. The achievement of good land use practices on a broad basis depends upon it being to the citizen's advantage to take a long term view of the quality and productivity of land in his/her day to day actions.

Influences on Land Use Practices

The group recognizes that there are many influences and factors that are the cause of present land use practices and which make change of practice difficult. Chief among these are:

- Economic realities and constraints affecting agriculture, forestry, mining, urban growth, etc;
- Multiple jurisdictions at all levels of government which affect the use of land and lead to overlapping and conflicting policies where there is no central body with responsibility for maintaining good land use practices;
- 3. Traditional philosophy in Canada that land is a commodity to be used, and that natural resources are very extensive and little affected by human actions, has made it difficult to develop an attitude of husbandry or to develop political policies to preserve land capability.

Recommendations

The working group makes the following recommendations to the Councils:

1. Recognition that the use made of land is an environmental issue:

Councils are urged to impress upon their Ministers of Environment that land use and the control of land use practices are essential components of their environmental responsibilities. While many agencies and jurisdictions have policies, responsibilities and activities that affect the use of land, the Ministers of Environment should be held responsible for ensuring that proper land use practices are carried out in their territories.

2. Coordination of responsibilities and decision making with regard to land use:

In recognition of the many and diverse agencies with responsibilities affecting land use practices, Councils should press for establishment of coordinating mechanisms to obtain information about land use in order to develop appropriate policies to achieve improvement of land use practices.

Specific responsibilities for enforcement of good land use practices should be identified.

3. The need for better information and understanding:

Councils should urge Provincial and Federal agencies concerned with support of scientific research to recognize the need for increased and sustained study of land use problems including:

- a) Improved methods and technologies for determining land capability and compiling inventories of land use;
- Methods of identifying and predicting the biophysical consequences of different land use practices or changes in land use and their implications for land productivity and capability; and
- c) Methodology for identifying, quantifying, predicting or evaluating the economic and social consequences of land use changes.

4. Citizen awareness, concern and action:

Councils should urge that information relevant to land use and the effects of land use practices be collected and made available to the public in order to improve citizens' understanding so that they will call for political action to achieve improved land use practices.

In order to obtain this awareness, the following are recommended:

- a) A land use information system should be developed. This system should be designed (i) with the needs of users in mind; (ii) to be able to produce information whenever required even when data are not complete; (iii) to make use of and coordinate data from several sources; and (iv) to take full advantage of new techniques of information gathering and presentation such as remote sensing, computerized cartography, etc.
- b) Land use information should comprise: (i) inventories of land use; (ii) data on changes in land use obtained through regular and systematic monitoring; and (iii) interpretations of land use data in economic and social terms related to identified time periods and socio-economic assumptions.
- c) There should be a review of land classification criteria in an environmental context so that the established uniform land use classifications are not misused or misinterpreted but can provide the basis for more useful land capability assessments in each regional or socio-economic situation.
- d) To make land use information and concerns available and useful to citizens at large, it is necessary to prepare educational materials on land use for both formal and informal instruction, and to devise and carry out publicity and educational programs.

Ministers of the Environment have responsibilities to initiate and contribute to such programs.

5. Financial aspects of improving land use:

- a) Councils should urge their Ministers of Environment in concert with the financial and taxation authorities: (i) to undertake a systematic investigation of the effects of current real property assessment and taxation policies on land use practices; (ii) to establish a regular procedure whereby the effect on land use practices is considered when any new government fiscal, resource development, or urban development programs are decided upon.
- b) Councils should urge that sustained land capability and productivity in relation to current land use practices be taken into account when establishing: quotas for agricultural or forestry production, market targets, incentives for summer fallowing or crop change.
- c) Councils should urge Ministers of Environment together with Ministers of Agriculture, Forestry and Municipal development to undertake a program for the identification and development of long term incentives for good land use practices. This program should include incentives for maintenance of land capability and where appropriate, for renewal of land productivity through planned multiple or sequential land uses.
- d) Councils should urge that the increased information about land capability and land use practices resulting from modern technology and better understanding of the socio-economic effects on resource management be applied to the development of better methods of identifying and defining land units in terms of land use capability for tax assessment, tax deferral, development zoning, or resource planning purposes.

ROLE OF THE CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The terms of reference shown on p.iv express the general mandate of the Canadian Environmental Advisory Council at the time of its establishment in 1972. From time to time, as Council gained experience, it has re-examined and revised its role as Council itself perceived it. The following statement, endorsed by the Minister of Environment, is the most recent articulation of this role.

- Identify important Canadian environmental problems, concentrate on the
 on the definition and analysis in principle of their biological, physical
 and social aspects and generate independent advice for the Minister on the
 best routes to be followed toward their solution.
- · Identify and define environmental problems of a more global nature:
 - a) which Canada shares with neighbouring countries; and
 - b) which affect Canadians as members of the world population.
- Receive requests and instructions from the Minister on environmental issues and actions, and respond with advice and recommendations.
- Anticipate and identify emerging issues and bring them to the attention of the Minister.
- Examine the environmental implications or effects of government action or inaction on the development of perceived and coherent government policy.
- Keep abreast of current environmental problems so as to be readily responsive to requests from the Minister.
- Evaluate the processes of environmental assessment and control so as to be able to identify apparent successes and failures and to propose improvements in their procedures and coordination.
- Communicate with the Canadian public on environmental issues and provide a focus for the expression of their concerns.
- Provide the Minister with independent views on the performance of the Department in meeting its responsibilities.
- Work with the Minister and the Department in support of non-governmental environmental groups.
- · Maintain liaison with the provincial and territorial environmental councils.
- Produce, as part of an annual report, an overview of the successes and failures of environmental activities in Canada, the lessons and the perceived issues.

Being neither a public interest group or an agent of any group, nor a part of the Department, but the Minister's advisory council reporting directly to him, the role of the Council is to speak as independently and forthrightly as possible. It is not simply to tell the Minister or the Department or the public of Canada pleasant, uncontroversial things but to "tell it as we see it" and thus at times its comments may be irritating, unpleasant or embarrassing.

A DECADE OF ENVIRONMENTAL CONCERN: RETROSPECT AND PROSPECT

D.A. Chant

In this report, I intend from the perspective of the years 1979 and 1980 first to look back at the environmental issues of the past decade: where have we been and what have we accomplished?; and then to look forward into the uncertainties and unknowns of the next decade: where are we going and what can we hope to accomplish?

As one reviews the environmental affairs of the 70's, a number of issues are noteworthy. Firstly, I am struck by the fact that, despite the doom and gloom that sometimes settles on even the most optimistic of us, we in Canada have achieved a number of environmental "successes" in the last ten years. These range from the control of specific pollutants to quantum changes in the attitudes and perceptions of the society in which we live towards the environment.

- The banning of some particularly harmful pesticides, and generally better control of pesticides and increased emphasis on non-chemical control.
- Rigorous controls of several classes of dangerous pollutants - PCBs, etc.
- Greater funding of environmental research (though still sadly inadequate).
- Preservation of certain parklands, wilderness areas, sensitive marshes, and the like.
- Actions to prevent heedless and destructive development in some of our urban centres.
- 6. Development of some systems for recycling and conservation and for the disposal of wastes.
- 7. And, finally, the significant changes in attitudes and perceptions that have led to such things as some of our political parties actually developing environmental platforms and formulating environmental Bills of Rights; to industries bringing forward environmental policies; to most of us seeing the hollowness, indeed vacuity, of statements, almost exactly ten years ago, to the effect that Canada has an abundant supply of oil for the next 1500 years; to most of us being outraged by statements to the effect that pollution is caused by rocks and trees and that if Environmentalists have their way we will all be living in rabbit holes and birds' nests.

The list of such "successes" is quite a long one and we can take some satisfaction in it. We have come a long way in ten years, but we still have a very long way to go.

During this decade we have achieved other advances as well, advances which in final analysis are more positive than the banning of this chemical or restrictions of that emission. The first of these is the degree to which we have institutionalized our environmental concerns. Institutionalization may have its disadvantages and dangers (complexities of organizations, bureaucratization, a civil service run rampant) but it is the way in which societies demonstrate their recognition of the importance of an issue and their determination to do something about it. Modern society is helpless to tackle a problem for which it has not first provided an institutional framework.

This report is based on a paper presented during Environment Week in Toronto in October 1980 which is intended for publication in Alternatives.

Thus we have seen, in the last decade, in every province and at the federal level, the establishment of departments responsible for our environmental affairs. Ottawa, and almost every province (notably not Ontario), now has an Environmental Council of one form or another to provide advice to governments. Environmental legislation and attendant regulations have sprung up on every side: EARP, FEARO, EA ACTS, EP ACTS, EA BOARDS, and hearing and appeal mechanisms. We can certainly question in this year 1980 how effectively these mechanisms have been used to date, but at least they are now in place, whereas ten years ago they were not, and we can use them effectively and vigorously if we have the collective determination to do so.

Many senior officials in departments of environment across Canada, and certainly in Ottawa, have developed a sincere commitment to protection and preservation. They are now much more than administrators in the bureaucracy of government. From the point of view of legislation, regulation, and the development of sound environmental policies, this may be one of the most significant developments of the last decade.

We have institutionalized our environmental concerns in other ways as well. Our schools now teach subjects of environmental relevance as a matter of course, whereas in 1970 a school thought itself progressive if it had a guest lecturer or two during the year to talk about the environment. Our universities have created faculties and institutes of environmental studies, and related course programmes. We have seen specializations in environmental law, environmental biology, environmental this and that, emerge over the decade, whereas formerly there were none.

Similarly, in the industrial sector, some companies have institutionalized their environmental planning and management as matters which receive full consideration in field operations, plant activities, and at the corporate level.

And, finally, over the last ten years we have witnessed the institutionalization of our environmental concerns emerge in the private sector, as represented by the phenomenon we refer to as environmental public interest groups. These organizations have become a real force in our political and governmental systems and they are now an accepted and respected part of the fabric of our society.

I cannot leave the discussion of achievements without commenting on one final encouraging development. In the late 60's, environmental problems were seen almost exclusively in the context of science and technology and it was through these disciplines alone that solutions were sought. Over the last decade it has been increasingly recognized that this was dangerously simplistic and that the scientific and technical aspects of environmental issues are only part of a much larger picture. This picture is now seen to include the whole areas of human values and ethics, of social wants and needs, of economic and political science — indeed almost every field of human interest and inquiry from philosophy to physics. I find this development greatly encouraging and one that bodes well for the future.

From an international perspective, the Stockholm Conference undoubtedly concentrated world attention on environmental issues and gave nations with the will a springboard for action. Consciousness of the need to protect the environment remains low, however, in most underdeveloped countries and in the long run this may be the greatest threat to the global ecosystem. We all can understand and sympathize with this: poverty and starvation do not lead to environmental sensitivity. Nevertheless, there is a limit to the success of environmental policies in Canada and other developed countries in a world that does not yet share our environmental concerns.

To be fair and maintain balance when reviewing the successes of the last decade, I should pause for a moment to mention also some notable failures. I include in these our failure to significantly limit the consumption of energy and to develop alternative sources of energy; our failure adequately to control the release of toxic chemicals into our environment and to develop safe methods for the disposal of toxics, including nuclear wastes; and our failure to develop policies in the areas of energy, land use, and the northern environment. Canada does not, even now, have a clear-cut, explicit policy regarding the environment, though one is being developed in the Department of Environment. Motherhood statements are frequent, but it is not acceptable to pay lip service to the environment and then to proceed heedlessly on courses of action guaranteed to destroy it. Some of these failures will be considered in greater detail when I discuss the future.

However, let us return to our consideration of achievements. All of these achievements of the past decade lead me to my most important observation regarding the environment in the 70's, an observation which sets the stage for looking ahead to the next ten years. There is abundant evidence that public interest in and concern over environmental affairs has not waned in spite of assertions to the contrary during the last few years. In poll after poll, Canadians continue to include the environment among their top concerns, right up there with inflation and unemployment. In a recent survey conducted for the Ontario Ministry of the Environment and reported in the current issues of Seasons (the new and most impressive publication of the Federation of Ontario Naturalists), "pollution" came fourth in our list of concerns. Ten percent considered it to be the most important problem facing Ontario, 87 percent favour stricter environmental protection, 62 percent think this would improve their standard of living and 80 percent think it would enhance the quality of their lives. In answer to the question "Are you more or less concerned about pollution problems now than a year ago", 67 percent were more concerned and only 6 percent less. In my view this is pretty conclusive evidence of substantial environmental concern.

Our interest and concern, however, have become much more sophisticated and knowledgeable over the decade just ended. No longer do we witness the innocence of a mock funeral for a polluted river. Today, we are more likely to see thoroughly informed people with environmental concerns challenging a hydro-electric utility in formal hearings about the narrowness of its procedures for calculating the true cost of generating electricity, or its projections of future demand. We see people in the Maritimes becoming knowledgeable about the pesticide Matacil before protesting its use in forest spraying in New Brunswick, and successfully stopping its use in Nova Scotia. We see non-governmental groups becoming as informed as government and industry officials about issues of the Arctic environment. The list of examples of this developing understanding and sophistication is a long one, and it is a healthy phenomenon which promises well for the Canadian environment in the long run.

Another feature of this is the growing understanding that "Environment" is a component of other issues of public concern for which different labels are used. Hence, energy, land use, food additives, forestry, agriculture and wildlife all have strong environmental content, and when Canadians express their concern on these issues they often are expressing their basic environmental concerns as well. Environment runs as a theme through most of the issues that are of concern to contemporary society.

There are several dark sides to the optimism that I have expressed above. One is that Canadians are in danger of becoming almost complacent about some environmental problems. One example of this is the service provided by the Ontario Ministries of Environment and of Natural Resources in annually publishing A Guide to Eating Ontario Sports Fish. Lake by lake and species by species, this guide relentlessly indicates which fish are safe to eat and which are too contaminated by mercury, DDT, Mirex, PCBs, and other pollutants for safe consumption. Many sportsmen and their families use this guide as it is intended, but too often matterof-factness has blunted the sense of outrage we all should share that our lakes have become so contaminated that a guide is necessary to eating their fish safely in the first place. And where is our determination to so order our environmental affairs that, at some point in the future, such a guide will no longer be needed, and once again we can fish and enjoy our catch without being afraid of poisoning ourselves?

Another dark side to optimism leads me to look ahead into the future. It is an evident fact that our most pressing environmental problems are becoming worse with each passing year. One encouraging feature associated with this observation is that over the past few years we have sharpened our focus and begun to put priorities on the host of environmental issues with which we must grapple. Hence, a succession of Ministers of the Environment have put toxic chemicals, acid rain, and water quality near the top of their priority listings. To these can be added the issues of Canada's northern environment, wildlife and overharvesting of other renewable resources. However, setting aside the encouraging fact that at least priorities are beginning to be established, it remains that these priority problems generally are getting worse, not better.

In central and eastern Canada, the problem of acid precipitation is receiving widespread attention. With the announced intention of Presidents Carter and Reagan of giving greater emphasis to the use of coal for generating electricity in the United States, and with our own lack of firm resolve in controlling point sources and the emission of sulphur dioxide and nitric oxide from automobiles, it would seem that the harmful effects of acid precipitation can only continue to escalate. Several hundred lakes in Ontario already are biological deserts because of acidification and, by the Ontario Government's own calculation, thousands more are threatened at present emission levels. With every evidence that acid precipitation will increase, the future of these lakes seems bleak indeed.

Investigations of other effects of acid precipitation are in their early stages, in particular damage to vegetation and effects on soil. Already, however, it seems clear that damage to buildings in Canada runs to many millions of dollars each year. The study of the effects of acid precipitation on human health is also in its infancy, but already there are disturbing claims that these effects are not insignificant.

The issues of toxic chemicals and ecotoxicity are equally disturbing. There are a number of particularly serious aspects of this issue. Our far too careless approach to the transportation of toxic chemicals was highlighted by the recent massive chlorine spill in Mississauga, Ontario, and by a PCB spill in Regina, Saskatchewan. Attempts to develop safe facilities for the disposal of toxic wastes have created unresolved controversy and confrontation in communities across Canada. The introduction of new synthetic toxic chemicals into our industry and commerce remains largely unregulated except for pesticides, food additives and drugs. There are literally thousands of these chemicals now in our environment and hundreds more are introduced each year. As more analyses are done, more and

more toxics are discovered in our waste systems and in indicator organisms such as sportfish referred to earlier. Yet, in spite of all these disturbing observations, the science of toxicology is still almost in its infancy in Canada, both as to our ability to train modern toxicologists to meet our rapidly expanding needs for research, monitoring and regulation, and as to our ability to develop techniques for studying complexes of chemicals in the environment and their effects on organisms - ecotoxicity.

In contrast to this generally negative picture, there are a few bright spots. The effects of banning DDT a decade ago are now being realized, with lower residues of this pesticide in falcons, lake trout and other wildlife in some parts of Canada. And with the recent ban on PCBs, in a few years we may expect to enjoy a similar relief from contamination by these substances. Nevertheless, despite these advances, toxic chemicals remain one of the most serious and pressing environmental problems of our times.

Water is a medium where a number of environmental problems have their focus, including toxics and acid precipitation, but also sewage, siltation, agricultural run-off and a host of others. Canada made progress in preserving the quality of our water systems in the early part of this decade by restricting the use of phosphates in detergents, and several provinces have made important progress in controlling sewage pollution. However, in other provinces, sewage treatment still seems to be viewed as an unnecessary frill rather than a condition of modern civilization.

Water quality, then, remains a matter of deep concern in virtually every water system in southern Canada and it is given high priority in most jurisdictions. Because Canada shares many of its water systems with the United States, actions to protect and restore water quality require international agreement and cooperation.

Canada's extensive northern regions have a complex of environmental problems and potential problems, exacerbated by tangled and sometimes competing jurisdictions, which too often vie for power rather than addressing the problem, and negative confrontations between the forces of development and those of preservation. The offshore search for hydrocarbons has created what is probably the single greatest environmental issue North of 60°, with many experts, including those in government, industry and the private sector, agreeing that the momentum of exploration has far outstripped our capacity to deal with the environmental problems that may result. It is not, of course, simply the drilling and extraction that pose the problems, real and potential, but the entire infrastructure that supports the exploration and will be needed to service production, from tankers and pipelines to storage facilities and new communities. Canada's research effort in the North is seriously inadequate in a number of key subject areas, and the view has frequently been expressed that Environment Canada should have a more explicit and emphatic mandate for environmental affairs in the North. The Drury Commission recently expressed a similar view.

Canada's major wildlife problems largely centre on the North as well. Overhunting seems to pose the most serious threat, but there are site-specific problems as well, for example, the Dempster Highway, and future pipeline construction poses new problems. Allegations are legion regarding overhunting by northerners, especially of caribou and marine mammals. One thing seems certain -

the effort expended on wildlife research and management, and on enforcement of regulations, is grossly inadequate, and on some key species it is actually shrinking. When separate censuses of a single caribou herd can vary by more than 100 percent, obviously there can be no sound basis for management of the herd. With modernized hunting methods, tangled jurisdictions, an uncertain legislative base and inadequate regulation, the equation could well spell disaster for some species.

This is not to say that Canada's wildlife problems occur only in the North. We in southern Canada have much to account for as well, though the species we have abused generally are less spectacular than those in the Territories. Pesticides, other pollutants and habitat destruction have eliminated or placed in serious jeopardy many forms of wildlife in southern Canada - from the extinction of the Atlantic salmon and blue pickerel in Ontario, to the endangered peregrine falcon, bluebird, spotted turtle, blue racer, and many other animal species. To this list can be added a number of endangered plants.

In a related vein, there are serious problems of overharvest with other so-called renewable resources in Canada. With the evolving policy of greatly increasing the harvesting of our *forests* in the next two decades, for example, there is serious danger of depletion without an effective and much expanded programme of replacement, and of the forest industry expanding into sensitive and unique areas.

In the area of *fisheries*, almost all of our marine commercial and sports fisheries seem to be overharvested and in danger of depletion. The catch of nearly every major species from the Atlantic salmon to cod and groundfish, seems to be dwindling. With the salmon, part of this can no doubt be attributed to the destruction and pollution of spawning waterways, but overharvesting of all of these species lies at the heart of the problem.

Another problem of rapidly increasing importance is that of the impacts of recreational activities on areas of special environmental interest and sensitivity - parks, wilderness areas, ecological reserves, and the like. As leisure time grows and Canada's (and the world's) population continues to grow, pressures on these areas will become ever more acute and the conflicts between the developers and the preservers will intensify. We have seen this recently in the conflicts over the twinning of the Banff Highway, the plan for Kluane Park in the Yukon, and the situation in Ontario regarding Algonquin and Killarney Parks.

And, finally, and to some eyes most important, one cannot consider the future in an environmental context without placing the issue of energy front and centre. As oil and gas come into shorter supply in the years ahead, issues of using "dirty" alternatives such as coal, of searching for new supplies in prospective areas, of land use, and of conservation will become increasingly important. Energy lies at the heart of the problem of environment - or perhaps I should state that in reverse: environment lies at the heart of the energy problem. Energy is environment!

This, then, is a brief overview of some of the major environmental issues confronting Canadians in the next decade. In it, I have touched on problems of acid rain, toxic chemicals, water quality, the northern environment, wildlife, habitat destruction and overuse of resources. If we trace the origins of each of these, we will find at the source our contemporary life style and the human fascination with growth and consumption. There are some who argue that the changes that are required in the ways in which we conduct our human affairs will be so profound that there really is no way to get to where we must go from where we are now. This is to counsel despair and most of us, I think, are too optimistic to succumb. We have taken significant steps to solve some of our environmental problems and we have created an administrative and legislative framework within which we can act in the future. On some fronts there is cause for cautious optimism. On others, there is cause only for deepening concern and an urgent need to reaffirm our commitment to the solution of our environmental problems in Canada.

ENVIRONMENTAL ASSESSMENT AND REVIEW PROCESS:

OBSERVATIONS AND RECOMMENDATIONS

I. INTRODUCTION

In December 1978, the Minister of Environment asked the Canadian Environmental Advisory Council to conduct a review of the Environmental Assessment and Review Process (EARP) and the relationship of the Federal Environmental Assessment Review Office (FEARO) with the Department of Environment (DOE).

Accordingly, Council established a Task Force (P. Garigue, M.J. Loveys, D.A. Chant and T. Beck) which held discussions with FEARO personnel, public interest groups, a representative of industry, staff of other federal departments concerned with the Process, and with a member of the Ontario Ministry of the Environment.

The Task Force concluded that an examination of the effectiveness of the Environmental Assessment and Review Process (the Process) was the main pursuit to be undertaken. This is addressed in this report in the form of a list of 23 recommendations; they represent the findings of the Task Force which have been discussed and endorsed by the full Council. It is recognized that the implementation of a number of these recommendations will require more resources than are at present available to FEARO, and that additional funds and personnel must be secured to ensure the effective operation of the Process. The degree to which the recommendations are accepted and implemented will reflect, in the opinion of Council, the importance which the Government of Canada attaches to the resolution of the environmental problems facing our nation.

A number of principles were identified which governed Council's choice of recommendations. These should form the basis for procedures developed to improve the Process:

- The Minister of Environment and not the initiating agency* should have the final decision of whether an environmental assessment review is required;
- public participation is a vital part of the Process;
- notwithstanding the desirability of public monitoring and involvement in the Process, DOE should present the environmental point of view at all stages of the Process;
- monitoring the compliance of conditions attached to a project is essential;
- the independence and strength of panels and hearings must be increased;
- initiating agencies must be accountable to FEARO and to the Canadian public for decisions made at the screening stage;
- DOE projects should be subject to the Process.

The Process has been improved through experience and its capacity for further improvement and adaptation must be maintained.

The Process, no matter how much improved, will not in itself ensure environmental protection. Certain kinds of initiatives, in particular site specific developments, are amenable to assessment by means of the present Process, though some improvements are desirable. Other environmental issues, such as the impact of new technologies, the individual or synergistic effects of new chemical compounds, financial subsidies and cost sharing agreements, general policies related to resource development or the cumulative effects of small projects do not readily lend themselves to evaluation by the Process. It is the particular responsibility of DOE to develop innovative procedures and approaches to ensure environmental evaluation of such issues.

^{*&}quot;agency" includes government departments and quasi-government organizations such as Crown Corporations.

The Environmental Assessment Review Process cannot take the place of comprehensive environmental processes and policies for Canada. Nevertheless, the Process is and must continue to be an important and necessary part of the means by which Canadians can ensure the continued quality of their environment.

II. THE PANEL HEARINGS

The panel hearings, with an allocation of 10 man/years in FEARO, are by their nature the most publicly visible part of the Process. Perhaps due to this visibility, they have been in some respects the most conspicuous aspect of federal environmental decision-making. The hearings are the part of the Process that have received the most criticism but Council recognizes that the hearings are evolving and improving as experience is gained. Flexibility to evolve should be maintained, in particular to develop the ability to hold not only formal sessions to examine technical questions but also informal, less structured and potentially less intimidating sessions to hear local expression of opinions.

1. The panel hearings have no legislative mandate. This lack of authority results in the fact that the panel members and intervenors are unable to subpoena either witnesses or information, and weakens their ability to insist that all relevant information be brought forward.

POWER OF SUBPOENA

It is recommended that FEARO look into ways of establishing a power of subpoena for the panel hearings.

2. The skill, perception and rulings of the chairman are major factors in determining the quality of the panel hearings. It is often the perceived shortcomings of the chair that give rise to adverse criticism, and this may be partly due to an unreasonable workload. As of September 1979, three FEARO staff members were chairing 15 projects. This workload is excessive.

PANEL CHAIRMAN

It is recommended that:

- i) the number of chairmen on FEARO staff be increased.
- ii) the chairmen be given appropriate career advancement opportunities within FEARO in order to retain their services.
- iii) each chairman be assigned few enough projects so that he she will have the time required to evaluate and improve the quality of the Process as well as to attain a thorough knowledge of the issues, prepare analyses and produce reports.
- iv) strong consideration be given to appointing, as the occasion demands, chairmen from outside the public service.
- 3. The credibility of the hearings depends in large measure on the perceived capability and objectivity of the panel members. The composition of the panels should be balanced, with members from industry, government, university, the informed public and local residents. It is recognized that securing qualified candidates who are able to commit their time is a continuing problem.

PANEL COMPOSITION

It is recommended that:

- i) efforts be made to establish a standing list of potential panel members from industry, university, government and the public who can be canvassed for their availability for each hearing.
- ii) panel members receive intensive preparation for their role on particular panels.
- iii) arrangements be made to relieve them completely of their normal duties so that they can devote the time required to their panel responsibilities.
- iv) increased efforts be made to secure panel members with knowledge of and sensitivity to local situations, attitudes and concerns relevant to the project.
- v) proponents or persons with vested interests be excluded from membership on panels.
- 4. The 1977 Cabinet Memorandum permits the appointment of panel members a) from within the federal public service by the panel chairman in agreement with the initiating agency; and b) from outside the federal public service by the Minister of Environment in agreement with the Minister responsible for the initiating agency.

APPOINTMENT TO PANEL

It is recommended that the initiating agency should have neither the right to, nor a veto over, panel membership.

5. Through the actions of the panel and the participation of the panel secretariat, FEARO should actively ensure that all major issues and points of view are fairly and adequately presented at the hearings.

ROLE OF THE PANEL

It is recommended that:

- i) the panel evaluate all information disseminated prior to the hearing by the proponent or initiating agency or any other intervenor and interested party, in order to determine its veracity or possibility of ambiguity, and that the panel exercise its judgement in calling witnesses to clarify potential misconceptions.
- ii) the panel ensure that there is an adequate range of balance of opinion of experts and intervenors at the hearing.

6. It is recommended that:

ROLE OF SECRETARIAT

- i) the panel secretariat assist the panel with 5(i) and 5(ii) above.
- ii) the panel secretariat should not become a screening mechanism but should assist the panel in bringing information forward.
- 7. The Department of Environment has a basic responsibility to protect and enhance the quality of the Canadian environment. As the agency commanding a wide pool of expertise, it has a vital role to play in the assessment of environmental impacts.

ROLE OF DOE

It is recommended that:

- i) DOE continue to play a major role in the setting of guidelines for impact assessment work, in peer review of the assessment, and in providing departmental expertise to the hearing.
- ii) DOE present to the Panel a thoroughly researched position on the project, including the potential impacts of a project, and the potential for mitigating such impacts.
- 8. Government experts who can make the most valuable contribution to the panel hearings are most often those whose principal jobs and principal interests involve their research activities. Participation in EARP hearings detracts from and interrupts individual or group research programs, a situation already aggravated by budget cuts, and excessive periods of detachment to serve as experts may influence their normal career opportunities. Nevertheless, some projects have potential impacts of such magnitude that the best persons should contribute their expertise to the decision-making.

EXPERT WITNESSES

It is recommended that the responsibility of government agencies to contribute to the Process at all stages, including participation in the hearings, be recognized and scheduled as a regular part of the work load, as well as being made an important individual career advancement criterion.

9. The analysis of the costs and benefits of citizen participation is complex and defies quantification. However, for many projects, the Process provides the only opportunity for concerned citizens to be heard on the broad range of issues and the only chance to be involved in the decision-making process. Accordingly, citizen participation should be given as much encouragement as possible as one of the raisons d'étre of the Process.

FEARO should be in a position to influence the availability of funds to support such participation according to the scope and scale of the project, the extent of the affected area, the significance of the potentially threatened resources, and the national significance of the project.

CITIZEN PARTICIPATION

It is recommended that:

- i) given the disparity between the resources available to some proponents and initiating agencies and those available to local community or public interest groups or individuals, funds be made available to such groups for research costs and other expenses where, in the opinion of the panel, the information and points of view to be presented are relevant and worthwhile.
- ii) these costs of participation be borne by the proponent and/or initiating agency, unless the panel directs otherwise.
- iii) the determination of the total amount of funds to be allocated to support intervention should be made well in advance of the hearings, and a substantial portion of funds allocated be provided in advance to permit adequate preparation of the intervention.
- iv) the format and scheduling of the hearings be designed to assure adequate quality and scope of participation. In particular, some sessions of the hearings should be held in locations easily accessible to intervenors who have demonstrated interest in the project, especially where the issues are of national importance.

III. THE SCREENING PROCEDURE

FEARO has acknowledged the importance of the screening procedure by assigning three staff positions to encourage and assist the initiating agencies in this regard. The great majority of projects receive any kind of screening only within the initiating agency, and FEARO has endeavoured to facilitate this procedure by preparing a *Guide for Environmental Screening*. Council considers that there is need for certain improvements in the screening procedure, either by additional or more stringent requirements.

10. Notwithstanding the Guide for Environmental Screening, agencies vary greatly in the importance and consistency they apply to their method of initial screening of their projects. They are expected to provide information to and obtain comment from the public, but are not required to do so. An inconsistent approach inhibits citizen input, makes it difficult for FEARO to monitor the quality of the screening, and results in uncertainty.

CONSISTENT APPROACH

It is recommended that each initiating agency be required to formalize, document and make public its procedure developed for initial environmental review of its projects; and that FEARO include this information in its explanatory literature regarding the Process.

LISTING OF PROJECTS

- 11. It is recommended that each agency provide to FEARO, and FEARO publish bimonthly, a list of all projects or programs
 - i) of a cost greater than \$1 million that were approved without an environmental hearing;
 - ii) that received initial screenings, with brief statements of the findings and the conclusions regarding the need for further study;
 - iii) for which Initial Environmental Evaluations were completed, with the major findings, alternatives and conclusions resulting from further review.

PUBLIC RESPONSE

- 12. It is recommended that FEARO develop means of assessing responsible public reaction to the published decisions relating to the screening and IEE stages; and that the Minister of Environment require an evaluation of any decision against further review if reasonable representation is received within a stipulated period of time following publication, from the public or from another agency.
- 13. The Process should not be dependent on the uncertain resources and demonstrated concern of public interest groups or individuals, notwithstanding Recommendation #12.

ROLE OF DOE

It is recommended that DOE continue to provide technical advice to initiating agencies to assist them in reaching appropriate screening decisions and that DOE consistently monitor the published screening decisions so as to be in a position to provide timely advice to the Minister if environmentally inappropriate screening decisions have been taken.

14. The proponent is not always aware of the reasons for decisions resulting from the screening procedure regarding environmental acceptability, or of the criteria used to determine the extent of environmental impact which would determine if a project should be subjected to the full Process. This lack of information is aggravated by the inordinate length of time required by some government agencies in coming to a decision.

RELATIONS WITH PROPONENTS

- It is recommended that FEARO, in conjunction with the initiating agency:
 - i) provide an explanation of decisions to the proponent;
 - ii) establish minimum criteria regarding "potentially significant environmental effects" in order to help determine whether or not a project should proceed to the panel hearings stage of the Process:
 - iii) make efforts to expedite the initial screening procedure without sacrificing the quality of the assessment.

IV. THE SCOPE OF THE PROCESS

15. During the assessment of some projects, analyses of the need and of the options available are necessary for the proper evaluation of acceptable environmental risks. It is advantageous to both proponent and public to have the opportunity to discuss the question of need and alternatives at one or more stages of the Process, which is understood to be the current practice. In addition, many government policies in the past were formed with little or no environmental consideration. As the federal environmental process, the Process should have the latitude to criticize government policies on environmental grounds.

ANALYSIS OF NEED

It is recommended that:

- i) the guidelines for the environmental assessment explicitly state whether or not need and options will be part of the terms of the study and hearings; and if so, that the proponent be required to submit information on the need and options as part of their impact statement;
- ii) the panel explicitly include its analyses of need and options as part of its evaluation, as it sees fit;
- iii) the panel should require that the government policies relevant to the project be explicitly stated during the hearings, but should not accept them as absolutes if their environmental effects are considered substantial.
- 16. The analysis of socio-economic impact is an essential element in the proper evaluation of environmental impact. The question concerns the appropriate future use of the area or resource concerned rather than the acceptability of impact.

SOCIO-ECONOMIC IMPACT

It is essential that the socio-economic impact of the project be considered an integral part of the assessment to the extent considered appropriate by the panel.

17. At present, only discrete projects are evaluated under the Process. To avoid repetitious hearings on the one hand and ad hoc decisions on the other, it is desirable that programs and policies be also evaluated for their environmental impact, preferably before their adoption. In most cases, this is best accomplished by means of environmental scrutiny by DOE, and consultation with other departments. In some cases, a review by a panel under the Process might be an appropriate way to evaluate the environmental impacts of a policy or program.

ASSESSMENT OF PROGRAMS AND POLICIES

It is recommended that:

- i) the Minister explore the range of ways by which policies and programs of the federal government may be subjected to environmental scrutiny;
- ii) criteria be developed by which to determine which policies and programs are most appropriately evaluated by the present Process.
- 18. Class assessments, which are used in Ontario and several other jurisdictions, may be useful tools for the assessment of some policies, and more likely for some programs. Class assessments are conducted for certain types of projects, such as logging roads or specific industrial processes. After completion of a class assessment, specific projects need be assessed only so far as they have particular characteristics or potential impacts that differ from the general case.

Another useful format might be derived from the procedures of the National Energy Board (NEB). The NEB holds general hearings, e.g., on the demand and supply of natural gas in Canada, to provide a context for specific projects, e.g., export applications. FEARO could hold hearings on the environmental sensitivity and productivity of a region, which would expedite and provide a context for development in that region.

CLASS AND REGIONAL ASSESSMENTS

- It is recommended that FEARO examine the class assessment, regional assessment and other study formats for potential usefulness in assessing the environmental impact of projects, policies and programs.
- 19. Crown Corporations are at present only *invited* to consider themselves subject to the Process.

CROWN CORPORATIONS

- It is recommended that steps be taken to ensure that the Process can be applied to projects which are the responsibility of Crawn Corporations or other government agencies presently exempt.
- 20. At present, the Process applied only to projects where federal funds or lands are involved. There are cases where the federal government has a regulatory or controlling role regarding projects with potential environmental impact.

LICENCES OR PERMITS

- It is recommended that consideration be given to expanding the mandate of the Process to cover all projects of environmental significance to which federal licences or permits apply.
- 21. In some cases, the panel recommends that a project may proceed contingent on efforts to mitigate environmental impact. The responsibility for monitoring the project for compliance is unclear and indeed projects have proceeded without mitigating measures.

MONITORING

It is recommended that:

- i) FEARO designate an agency to monitor projects for compliance. This monitoring agency would normally be DOE except in cases where DOE is the initiator of the project.
- ii) that FEARO be empawered to intervene if conditions for environmental protection are not being met.

PUBLICATION OF REPORTS

- 22. It is recommended that the Minister give prior blanket approval for panel reports to be made public without the necessity of obtaining agreement from other agencies.
- 23. Council considered various reporting arrangements and the matter of FEARO autonomy.

REPORTING RELATIONSHIP

It is recommended that FEARO continue to report directly to the Minister of Environment, and to be independent of the Department.









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Canadian **Environmental Advisory** Council

Review of Activities



Canadian

Environmental

Advisory

Council

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary
Canadian Environmental Advisory Council
c/o Environment Canada
Ottawa, Canada
K1A 0H3

Ce rapport est disponible en français

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council was established in 1972 by decision of the federal Cabinet, to advise the Minister of the Environment on:

- such matters as may specifically be referred to it by the Minister;
- the state of the environment and threats to it;
- the priorities for action by the federal government or by the federal government jointly with the provinces;
- the effectiveness of activities of the Department of the Environment in restoring, preserving or enhancing the quality of the environment.

The Council is composed of up to sixteen members who serve in an individual capacity and are drawn from a wide cross-section of Canadian life and from all across Canada. Officials of the Department of the Environment (DOE) are not members of the Council; however the Department provides a continuing Secretariat.

To carry out its functions the Council undertakes studies and reviews of matters of environmental concern and policy, holds regular meetings to consider progress and developments with regard to these concerns, and prepares comments, statements and reports as appropriate.





Canadian Environmental Conseil consultatif Advisory Council

canadien de l'environnement

February 14. 1984

The Minister Department of Environment Ottawa Ontario

Dear Mr. Minister:

We are pleased to transmit to you this Review of the activities of the Canadian Environmental Advisory Council. The Review is unusual in the sense that it covers a period of two years and three months, from January 1, 1981 to March 31, 1983. This will enable Council to change from reporting on a calendar year basis to reports covering the fiscal year, from April 1 to the following March 31. It is also Council's intention to report on an annual basis in the future.

This Review contains a record of Council's activities during the period mentioned above. It also includes abstracts or summaries of Council reports which were prepared during that time, and information concerning meetings of the federal and provincial environment councils.

I should draw to your attention one noteworthy milestone in Council's history: its 10th anniversary, which occurred in March, 1982. We believe that Council has played a needed role during the past decade by providing the Minister of the Environment with an alternative source of advice which reflects the views and experience of a knowledgeable and concerned cross-section of Canadians. Council has been pleased to assist you and the Department to focus public attention on some of the major environmental issues of the day. I am confident that Council will be able to build on that decade of experience to perform an equally effective role in the years ahead.

Yours sincerely.

T. Beck Chairman



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COUNCIL OPERATIONS

Membership

Membership in the Council ranged between 12 and 15 during the period covered by this report. The members as of March 31, 1983 are listed in Annex 1.

This period was marked by the end of a decade of service to Council by one of the original members. Dr. D.A. Chant of Toronto, Ontario, was appointed in 1972 when Council was formed and served as an active member for 10 years, including three years as chairman, from October 1979 to his retirement from Council in March 1982. The Minister appointed Mr. Tom Beck of Calgary, Alberta, as the new Chairman, effective May 1982. Mr. Beck had served on Council since July 1978.

Dr. Robert Bergeron of Chicoutimi, Québec, and Dr. P.F.M. McLoughlin of Comox, British Columbia served as vice-chairmen.

The following members completed their service on Council during this period:

Dr. D.A. Chant, Chairman and President, Ontario Waste Management Corporation, Toronto, Ontario;

Mr. J. Chollet, Vice-President, Cie de Papier Rolland Ltée, Montréal, Québec;

Dr. M. Franklin, President, University of Windsor, Windsor, Ontario;

Mr. M.A. Gill, Chief of Conseil des Montagnais du Lac St-Jean; Dr. R.H. Hall, Department of Biochemistry, McMaster University Medical Centre, Hamilton, Ontario.

New members appointed to Council included:

Ms. S. Holtz, Ecology Action Centre, Halifax, Nova Scotia; Mr. M. Hummel, Executive Director, World Wildlife Fund (Canada), Toronto, Ontario;

Mrs. L.B. Lepage, Federation of Associations for the Protection of Lakes, and Nature Conservancy of Canada, Montréal, Ouébec.

Meetings

During the period under review there were 11 full meetings of Council. Eight of the meetings were held in Ottawa. Three meetings were held in other centres to give members of Council an appreciation of circumstances and specific issues in various parts of Canada. Two of these meetings were held in conjunction with assemblies of federal and provincial councils in order to make the most effective use of travel time and funds and to give members an opportunity to interact with their provincial counterparts.

Council met in May 1981, in British Columbia. Subjects for briefings and/or field visits during that meeting included: environmental planning in the Pacific region, water management in the Nicola Valley, the Hat Creek thermal power plant, the Thompson River basin study, the Afton Mines mining operation, and the mill and woodlands operations of Balco Industries Ltd.

Council met the following month in Alberta, the day prior to the 1981 Assembly of Environmental Councils, hosted by the Environment Council of Alberta.

In 1982 Council met on June 6 in Nova Scotia, prior to the 1982 Assembly, hosted by the Nova Scotia Environmental Control Council, and again in Halifax on June 10 immediately following the Assembly. The latter meeting was devoted to briefings on regional circumstances and issues including energy, the marine environment, and public participation.

There were also 12 executive meetings held during the period, primarily in Toronto and Ottawa. These meetings were devoted to establishing Council priorities, scheduling activities including full Council meetings, and other Council business.

Committees

The main activity at the Committee level during this period was by the Northern Committee which met several times to deal with major northern issues. These meetings were normally held in conjunction with Council or Executive meetings. A Critical Issues Committee was also established. The result of the work by these committees is reflected in the report on Council Studies and Reviews.

During 1982 Council began to move away from the practice of establishing continuing committees in favour of ad hoc groups drawn together as required to study or review specific issues, and to report their findings to Council. This approach appeared to provide greater flexibility than the establishment of formal committees.

Publications

Published Council reports are the product of a study undertaken by Council as a whole, by a committee of Council, or by a member, former member or by independent sources on behalf of Council. Papers are either printed as a separate formal report or appear as an annex to the annual review.

Only a brief reference is given here to reports and other papers prepared or published during the period under review. Where applicable, additional information on the study which led to the report appears under Council Studies and Reviews, and an abstract or summary of the report appears as an annex in this review.

Three publications were issued by Council during this period:

- Annual Review 1979-80, covering the two calendar years. Two special papers were included in the Review: A Decade of Environmental Concern — Retrospect and Prospect, by D.A. Chant; and Environmental Assessment and Review Process — Observations and Recommendations, the report of a Council task force.
- A New Approach to Pest Control in Canada, Council Report No. 10, July, 1981, by Ross H.Hall. A brief reference to this study appears under Council Studies and Reviews, and an abstract is included as Annex 3.
- Wildlife Conservation Issues in Northern Canada, Council Report No. 11, October, 1981, by Ian McTaggart-Cowan. Reference is also made to this report under Council Studies and Reviews, and an abstract is included as Annex 4.

Three other reports or papers produced during this period have not yet been published:

- Water Management Problems in the Third World: Lessons for Canada, by Peter F.M. McLoughlin, being edited for publication as Council Report No. 12. Reference is made to this report under Council Studies and Reviews, and an abstract appears as Annex 5.
- An Overview of Current Trends and Thinking Regarding the Sustainability of the Productivity of Farmed Lands, with Emphasis on Western Canada, by

C.F. Bentley and L.A. Leskiw, being edited for publication as Council Report No. 13. Reference is made to the study under Council Studies and Reviews, and an executive summary appears as Annex 6.

- A Perspective on the Canadian Environmental Advisory Council was prepared by J.K. Fraser who had served as Associate Secretary of the Council from 1974 to 1982. Dr. Fraser's brief historical review is being published as Annex 7 of this Review.

A list of all Council publications to date is included in this Review as Annex 2.

Secretariat

There were changes during this period in the Secretariat, which was established within Environment Canada to provide services to Council. Dr. E.F. Roots relinquished his responsibilities as Executive Secretary in 1982 but continued to serve Council as Science Advisor. Dr. Roots began his association with Council in 1973 when he replaced the first Associate Secretary, Dr. F.K. Hare. A year later he was appointed to replace the first Executive Secretary, Dr. R.R. Logie. Also in 1982, Dr. J.K. Fraser, Associate Secretary, resigned from the Secretariat to accept a position with the Canadian Geographical Society.

Mr. M. McConnell was appointed Executive Secretary in 1982. Mrs. V. Halliwell continued with the Secretariat as Administrative Assistant, a position she has occupied since 1976.

COUNCIL STUDIES AND REVIEWS

This section of the report describes activities of the Canadian Environmental Advisory Council (CEAC) on a subject-by-subject basis. Descriptions have been included for those activities to which Council devoted a significant portion of its attention and resources, or which were considered to be particularly important. Some topics which, from a Council perspective, were of less importance are grouped under the heading "Other". No reference has been made to some subjects which appeared once or twice on a Council agenda but were considered to be of low priority, or not appropriate for action by Council.

Pest Control

One of Council's major initiatives during this period was preparation of the report on "A New Approach to Pest Control in Canada". This study was initiated in 1978 and the report completed and published in 1981. The study was undertaken by a member of Council, Dr. R.H. Hall. The subject was approached from the standpoint of pest control strategies rather than being limited to a review of the pesticides registration process. The report urged that the need for chemical pesticides be reduced by placing increased emphasis on development of integrated pest management strategies and biological pest controls. Other recommendations proposed the establishment of a separate pest control/managemen t commission within the federal government. and a more effective role in pest control by Environment Canada to protect against adverse environmental effects. An abstract appears as Annex 3.

The Minister announced release of the report at the 1981 Annual Meeting of the Canadian Council of Resource and Environment Ministers (CCREM), and the report was used as a background document for the 1982 Pesticides Workshop sponsored by CCREM. Council was represented at the Workshop, and members also participated in a review of the recommendations in the report with senior officials of Environment Canada. The report generated considerable public interest and, from the standpoint of requests and comments received, is one of the most sought after reports produced to date by Council.

Ecological Reserves

Council had been concerned for several years over the lack of decisive action to launch a long-term program to protect ecologically significant areas throughout Canada. There was a need for a truly national body, representative of all regions, to coordinate or carry on efforts initiated by several groups and agencies including the National Research Council's Associate Committee on Ecological Reserves, the Man in the Biosphere Program (MAB), and the United Nations' International Biological Program (IBP). CEAC's concerns were shared

by provincial councils, and a resolution was adopted at the 1981 Assembly of Environmental Councils of Canada urging establishment of a "national ecological reserves coordinating committee". Council made a number of recommendations regarding the need for a national coordinating committee, and for a program to identify and protect sites on federal lands. An organizational meeting was convened by Environment Canada in December 1981, leading to the establishment of the Canadian Council on Ecological Areas. CEAC was represented at the organizational meeting and its continuing interest is reflected in the membership of the Canadian Council on Ecological Areas.

Wildlife Conservation Issues

Concern that some species of northern wildlife might well be in a crisis situation prompted Council in 1979 to commission a study of the situation by Dr. Ian McTaggart-Cowan, a former chairman of Council. Council was concerned that some wildlife populations and their habitats might be threatened by changing social patterns including population shifts, major economic development initiatives, and jurisdictional uncertainties. It appeared that, combined with the above circumstances, support for research on wildlife in the North was given a low priority. The report, which was completed in 1981, documents major changes which have taken place in the North and their interaction with wildlife populations. An abstract has been reprinted in this report as Annex 4.

Environment Canada's Role in the North

The Northern Committee of Council as well as the full Council met on several occasions to review drafts of a general statement on Environment Canada's Role in the North. The amount of time and effort devoted to these reviews reflected Council's special concern with the northern environment. Substantial changes were made by the Department in successive drafts reflecting, in part, some of Council's criticisms and suggestions. The latter included the following points: the need for adequate resources for on-the-ground application of the Department's role; recognition of Environment Canada's role as an initiator of activities which benefit both the environment and the economy in the North; the linkage of social changes with changes in use and development of resources; the need for public consultation efforts which are tailored to northern circumstances; and a requirement for the Department to make a strong commitment to, and to provide leadership in protection of, the northern environment.

Water Management

One of the main features of the 1982 Environment Week was a Symposium on Water held in Calgary, Alberta. Council was

one of the sponsors. That symposium addressed what Council considers to be one of the major impending environmental issue areas: water management, in terms of both quality and supply. A member of Council, Dr. Peter F.M. McLoughlin, was invited to present a paper at the Symposium, and Council subsequently decided to publish his paper as a Council report. The paper, "Water Management Problems in the Third World: Lessons for Canada", draws on Dr. McLoughlin's extensive experience as a consultant in developing countries, and poses questions for Canadians to consider in relation to the Canadian record in water management. An abstract appears in this report as Annex 5.

Environment-Economy Relationships

During the latter part of 1982 and early 1983 Council focussed on the broad subject of environment-economy relationships as a priority issue. Council was concerned that economic problems at that time might lead to short-term economic recovery efforts which would disregard environmental safeguards and thus prejudice future environmental quality and long-term economic performance. It noted that environment-economy relationships could be identified as a basic element in virtually all the issues which it was called upon to study. Council undertook two specific initiatives within this subject area during the period under review. One was to urge identification and development of programs which would have a dual objective of stimulating economic recovery while safeguarding present and future environmental quality. The other was to propose that "Environment and Sustainable Development" be adopted as the theme for the 1983 Assembly of Environmental Councils of Canada. Council undertook preparation of background material for discussion. The theme was subsequently changed because of alternative priorities proposed by some of the provincial councils.

Biotechnology

Council reviewed progress in the general field of biotechnology, with particular reference to environmental aspects of its application. The review included a briefing on follow-up action to the study undertaken by a task force of the Ministry of State for Science and Technology, and on the activities underway within the Department of the Environment. Council's overall conclusion was that a key role should be played by DOE because of the potential for application of biotechnology in the resources field, including improvement of environmental quality through replacement of more environmentally damaging processes currently in use, and by the adoption of biological controls as an alternative to chemical pesticides. At the same time Council recognized the potential hazards which could result from indiscriminate use or partial knowledge of the consequences, and urged development of adequate methods of assessing the environmental impacts of innovation in the field of biotechnology, including an effective registration process for biological pest controls.

Council felt that activities in the field, particularly those related to the environmental field, lacked coordination and a sense of urgency which could leave Canada far behind other countries. Several specific areas for exploration were noted including microbial leaching of minerals, industrial and municipal effluents.

Sustainability of Agricultural Soils

In Council's view, the continuing productivity of agricultural land is a priority environmental concern because of the importance of soil as part of the basic life-support system. Council had discussed on several occasions, and had been briefed on threats to Canada's agricultural soil, including: wind and water erosion, acidification, salinization, contamination by chemicals, and changes in land use affecting prime agricultural lands. This issue had also been raised at Assemblies of Environmental Councils of Canada, indicating that the concern was common to all parts of the country. In 1982, Council launched two studies. Both are directed at an assessment of the impacts of soil degradation and changes in land use. An initial overview of current thinking by soil scientists undertaken by C.F. Bentley and L.A. Leskiw was completed in March, 1983, and a review appears in this report as Annex 6. A second in-depth study, with particular reference to economic aspects, was commissioned for completion in 1984.

Role of Council

A revised statement of Council's role (see Annex8) was approved by Council and referred to the Minister in October, 1981. Subsequent discussion has been oriented primarily towards increasing the effectiveness of Council, increasing its public impact, and defining its relationship with the Department and with environmental non-government organizations. An opportunity to discuss all questions related to role was provided by adoption of "The Role of Environmental Councils" as the main theme for the 1983 Assembly of Environmental Councils of Canada, and during the initial months of 1982 discussion of "role" questions was part of preparations for the Assembly.

The question of Council involvement in the development of departmental policies and strategies was also considered by Council. While Council had played a significant part in the development of the statement on the Department's northern role, it was agreed that workload and priorities would prohibit this degree of involvement with all departmental policies and strategies, and that future involvement would depend on the priority of the subject and Council's ability to contribute.

Priority Issues

Council focussed its attention on approaches to identifying priority or "critical" issues, in part as a result of discussions

with officials of Environment Canada on the Department's 1981 Strategic Plan. Those discussions involved not only the "priority" issues, but also an effort to identify activities of a low priority nature. The latter should receive less attention or be dropped, freeing resources and expertise for more important programs. Discussions also spanned the identification of priorities to aid Council in scheduling its own program of activities. Council examined the application of alternative sets of criteria, including the following:

- 1. The number of persons affected;
- 2. Timing of the effect;
- 3. Loss of productive capacity (physical change/value and qualitative change/value); and
- 4. Cost of mitigation/chances of success.

Proposed Ellesmere Island National Park

A review was made of plans for establishment of a national park on Ellesmere Island, Canada's northernmost island. Because of the extreme sensitivity of the area — even minor disturbances by man can remain visible for centuries — Council expressed concern about the degree of protection which could be provided by national park designation, and the effect of the increase in the number of visitors which would be generated. Council initially proposed that the area be designated as an ecological reserve in order to provide maximum protection for the sensitive environment. After further study Council agreed that national park status would be appropriate for the area, provided that there was firm application of the "Special Preservation" or "Wilderness" zoning classification. Council also urged that establishment of ecological reserves covering specific areas within the proposed park be retained as an ultimate objective.

DOE Public Consultation Policy

Drafts of this DOE policy were reviewed with Council periodically as the Policy was developed. Council made a number of criticisms and suggestions on the early drafts, particularly on the basis of its experience in organizing the initial annual meetings of the environmental non-government organizations. Council emphasized in particular the importance of regional meetings, the need to involve ENGOs in planning for the meetings, the requirement for adequate funding, and above all, the need for creation of a climate of trust and understanding.

Environmental Non-Government Organizations (ENGOs)

In 1977 and 1980 the Council had organized and funded the first national meetings of non-government organizations as a means of developing more effective communication between the groups and the Minister and the Department. After these pioneering efforts the Council passed the responsibility for

organizing future meetings to the ENGOs and Environment Canada. During 1981 and 1982 Council provided advice to the ENGO Steering Committee and to the Department. Council representatives attended the national meetings by invitation, and, as requested, meetings of the Steering Committee. Council's efforts continued to be directed towards its original objective of improving communication and understanding between the environmental groups and the Minister and the Department.

State of the Environment Reports

In previous annual reports Council had published specific reviews under the heading of "State of the Canadian Environment". Council refrained, however, from producing a broad report on the state of environmental conditions in Canada. It supported an initiative by Environment Canada in 1981 to produce a comprehensive state of the environment report. Council reviewed progress in developing the methodology for gathering and collating the information, and the structure of the report. In particular, although aware of the difficulties, Council supported the proposal that the state of the environment should be reported on a regional ecosystem basis. Council agreed to consider contributing to the report.

Law Reform Commission

The Law Reform Commission approached Council in 1982 regarding its project "Protection of Life, Health and the Environment". Council was briefed by the Commission on its function of making recommendations to Parliament on matters totally or partially within federal jurisdiction. The Commission was examining, in particular, the suitability and effectiveness of criminal law in relation to environmental pollution. Council provided suggestions to the Commission on factors which should be considered in the study, and provided comments on one draft paper by the Commission on the subject of "Private Enforcement of Federal Environmental Legislation". Council strongly supported maintenance of the right to private prosecutions on matters connected with environmental quality.

Yukon North Slope

This has been a subject of continuing concern to Council. Council noted the lack of progress in designating a Canadian counterpart to the U.S. Arctic Wildlife Range, and the inability over the years to establish a joint Canada-U.S.A. Arctic International Wildlife Range. The recent industrial proposal to establish a marine supply base at Stokes Point raised a number of fundamental questions. Council reviewed the history of efforts to provide protection for this environmentally sensitive and significant area, including: withdrawal in 1978 of 15,000 square miles for a future national park and other conservation purposes; efforts of citizens' groups to negotiate establishment of an International Wildlife Range to

protect the Porcupine caribou herd; negotiations on land claims with the Committee of the Original People's Entitlement and the Council for Yukon Indians; and establishment of the Beaufort Sea Environmental Assessment Review panel process. Council urged more forthright action to provide permanent protection for lands in the area. Also, in connection with the proposal for a marine base at Stokes Point to serve oil exploration in the Beaufort Sea, Council expressed strong support for the Minister's position that the decision should be deferred until completion of the Beaufort Sea Environmental Assessment Review panel process.

Global 2000

Council initially reviewed the "Global 2000" report which had been commissioned by the USA Government, and an outline of the proposed follow-up, "Global 2000 — Implications for Canada". Council supported preparation and use of this wideranging analysis of the future in order to promote public discussion. Council proposed that the report be used as the basis for regional seminars involving representatives of universities, industry and provincial governments to examine its implications for policies and future planning.

Science Policy

There was considerable follow-up discussion with the Minister and the Department during 1981 on the development of a Science Policy for the Department. This followed a review and recommendations by the Council in 1980, and a concurrent review including a series of science workshops undertaken by the Department. Council's concerns included, in particular, development of means to ensure a consistently high quality of scientific work in the Department.

Foreign Aid

The long-term concern of Council that environmental problems of emerging nations be addressed along with economic problems was given a particular focus by the 1981 report of a joint study by the Institute for Resources and Environmental Studies of Dalhousie University, and the North-South Institute. Council met with officials of Environment Canada to examine the problems involved in increasing environmental awareness in Canada's foreign aid activities, particularly those involving the Canadian International Development Agency (CIDA) and the International Development Research Centre (IDRC), and was briefed on energy aid to developing countries. Council recognized the problems inherent in establishing firm guidelines on environmental aspects of foreign aid because of the implications for extraterritoriality of Canada's laws and processes, but urged that environmental factors be systematically considered in planning and implementing foreign aid projects.

Environmental Assessment

Since its inception Council has had a continuing interest in the broad subject of environmental assessment, and has been called on several times to provide advice specifically on the Environmental Assessment and Review Process (EARP) and the Federal Environmental Assessment and Review Office (FEARO). A detailed review of EARP and FEARO was conducted by Council in the late 1970s and published in the 1979-80 Annual Review. During 1981-82 and the early months of 1983, Council was consulted regarding proposed changes in EARP, but Council's major involvement during this period was through a review of the guidelines for funding public participation in the hearings on the Beaufort Sea environmental assessment review. Council made several suggestions for changes in the detailed provisions, but expressed strong support for the general approach.

Other

Climate Change: A briefing was provided by the Department so that Council members would be aware of the latest evidence and thinking concerning climate change, particularly as a result of increasing levels of CO₂. A representative of Council attended a seminar for senior government officials and reported back to Council on the impacts expected in coming decades.

World Conservation Strategy: Council continued its involvement with the World Conservation Strategy during 1981 and 1982, including a review of a study by Environment Canada on the application of the strategy throughout the Federal Government.

Kluane National Park: Council followed up on earlier discussions regarding the proposed master plan for Kluane National Park, and a residual concern regarding the potential for incremental development on the Slims River East Trail. Council was advised that controls would be effected by regulations under the National Parks Act.

Energy: A review of issues in the energy field was undertaken by Council in 1981 and early 1982. This included study of reports on alternate energy, issues in the field of nuclear energy including nuclear wastes, the role of Environment Canada, and the National Energy Program. Briefings included one on policy in the energy field.

Forestry: Council received two major briefings on progress in developing forestry policies, and on a variety of initiatives in the forestry field. One of Council's major concerns was the need to commit land to forestry use on a long-term basis in order to encourage and justify investment in reforestation and sustained management.

Migratory Birds: A preliminary review of problems in this field prompted Council to propose that the resources devoted to migratory bird research and management be increased. Council was advised that a review of the role and priorities of the Canadian Wildlife Service was underway, and that this review would enable judgements to be made on the resource needs for the migratory bird program.

Wildlife Policy: During 1981 Council reviewed and commented on successive drafts of a proposed "Wildlife Policy for Canada". Council expressed overall concerns about the implementation of policy, particularly where intergovernmental collaboration is required.

Environment Canada: Its Evolving Mission: Council reviewed a draft of this document which describes the role of the Department and the underlying philosophy behind the role. Council made some specific suggestions for changes, but strongly supported the general style and approach.

Clean Community Project: The concept of a pollution-free model community stemmed from a workshop on toxic chemicals and the difficulty of regulation on a chemical-by-chemical basis. A series of proposals for studies were reviewed by Council and efforts made to obtain external funding to develop the proposal to the next stage. Departmental officials expressed interest in the proposal and undertook to examine it as part of the departmental program.

Acid Rain: Council periodically reviewed progress related to acid rain, particularly the active role played by the Canadian Coalition on Acid Rain. While Council provided advice and support to the Minister, no specific Council initiatives were undertaken.

Northern Conservation Policy: The Northern Committee reviewed a draft of the above policy statement by the Department of Indian Affairs and Northern Development (DIAND). The Committee, and subsequently Council, applauded the strengthened conservation approach by DIAND which would complement northern initiatives of Environment Canada. Council was subsequently represented at a workshop in Whitehorse which produced recommendations regarding implementation of the Policy.

Seal Hunt: Council was asked for its views on the seal hunt controversy. In its preliminary assessment Council noted that it is a difficult subject on which to develop a consensus because of the conflict between scientific and economic evidence on the one hand, and a dedicated concern for the environment and a strongly held set of values on the other.

Council also noted that the European ban on seal pelts was inadvertently affecting the livelihood of Arctic residents, and that the ban on baby seals may result in increased harvesting of adult seals, with greater losses due to open water hunting.

International Relations: In addition to action on the specific issue of Foreign Aid, Council received an extensive briefing on international relations in the environmental field from Environment Canada officials. Subjects covered in the briefing and subsequent discussion included Marine Environmental Quality, ratification of the Law of the Sea Agreement, activities of the United Nations Environment Program (UNEP), and of the Organization for Economic Cooperation and Development (OECD).

Canada-USA Relations: Council was briefed on major environmental issues in Canada-USA relations. This included, in addition to negotiations on acid rain, the Garrison Diversion, Skagit, Niagara River pollution, and Great Lakes water quality.

Enforcement of Environmental Regulations: Discussions with representatives of the Law Reform Commission on its studies related to enforcement of environmental regulations, and public concerns regarding the effectiveness and consistency of enforcement in pollution cases, focussed Council attention on this subject. After a preliminary review, Council recommended a review of enforcement practice, and preparation of an overall policy or approach to enforcement of environmental regulations.

Calgary Olympics: Concern was expressed in Council regarding the potential environmental impact of preparations for the 1988 Olympics. The concern was directed at the effects of federally-supported developments and visitor activities on environmental quality of the area, particularly key areas of wildlife habitat; and at the possibility of a last minute request for use of facilities in Banff National Park. Council was advised that no approach had been made to Environment Canada regarding use of the Park, and that any use of facilities in the Park would have to be in keeping with park policies and environmental principles.

Canadian Wildlife Service: Representatives from the Canadian Wildlife Service (CWS) of Environment Canada briefed Council on the review of the CWS role and responsibilities, its current program, the level of wildlife-related activities of Canadians, CWS northern activities including research and national wildlife areas, and international issues. Members of Council also met individually with the Task Force which was assigned to review and recommend on the future role of CWS.

FUTURE PLANS

The Advisory Council endeavours to maintain a balance in its activities among the study of major long-term issues, examination of impending problems, and provision of advice on immediate environmental issues. Because of the latter function it is difficult to project a complete program of Council activities beyond a few months. It was apparent, however, toward the close of the period under review that Council's 1983-84 program of activities would include action on the following topics.

Assembly of Environmental Councils of Canada

Council had undertaken to host the Assembly of the federal and provincial councils to be held in June of 1983. Preparations for the Assembly would be a major orientation of Council activities during the early part of the year. Additional information on preparations is included in the following section of this report.

Risk

Interest was initially focussed on "Risk Assessment", "Risk-Benefit Analysis", etc., through discussions on toxic chemicals, particularly pesticides. Subsequently, the Minister asked for Council assistance in enlarging public discussion on the broad subject of "risk". After a preliminary review of the subject, Council undertook to prepare a discussion paper.

Long-Term Resource Management

The need for improved approaches to management of renewable resources on a long-term basis was identified by Council on a number of occasions, usually as a result of discussion on a specific issue. The need for a long-term approach was also a basic element in the "Global 2000" and "World Conservation Strategy" studies. Council had a preliminary discussion on the subject, noting in particular the relationship with land-use planning, e.g., the need to commit land to

forestry use for at least one growth cycle of 70 years or more. Alternative approaches to the subject were being examined, including that of bringing forward long-term resource management requirements through a broad study of environment-economy relationships.

Environment-Economy Relationships

While Council was unable to make significant progress on this issue during 1982, it maintained its standing as a priority concern for Council for further action in 1983-84. Council recognized the complexity of the subject: it is an element of, or related to most, if not all environmental issues. On some specific aspects, e.g., cost-benefit of pollution control, there is considerable documentation, but there appears to be inadequate study and understanding of the total web of relationships between environmental quality and economic performance. Council planned to continue its efforts in this area during the coming year.

Northern National Parks

There was concern among Council members regarding the apparent lack of progress in establishing preserves of various types in the North to protect environmentally significant areas. Council initially considered a study aimed at a full range of protected areas including parks, wild rivers, wildlife areas, heritage sites, etc. Just prior to the end of the 1982-83 fiscal year, Council decided to focus its efforts on northern national parks, and to undertake a study with particular reference to economic aspects of northern parks. The study was to be completed in 1983-84.

Lead in Gasoline

Council had raised this issue with the Department in 1981. Council was asked, near the end of the 1982-83 fiscal year, for its views on alternative ways of reducing or eliminating the lead content in gasoline.

ASSEMBLIES OF ENVIRONMENT COUNCILS OF CANADA

Assemblies or "joint meetings" of the federal and provincial environmental councils have been held on an annual basis since the mid-1970s. The meetings have enabled the councils to exchange ideas, share common problems, learn from the experience of others, and build support for shared ideas and concepts.

Two meetings were held during the period under review. A brief description of each follows. Resolutions from the 1981 Assembly appear as an annex. It should be noted that, because the Assemblies have no formal status, resolutions are not adopted or voted on by the joint councils as a body but are "accepted" with the understanding that each council will act according to its views and circumstances.

1981 Assembly

This meeting was held in Banff, Alberta, May 31 to June 4, and was hosted by the Environment Council of Alberta. All jurisdictions except Prince Edward Island, Yukon and Northwest Territories were represented. Nine members of the Canadian Environmental Advisory Council participated.

The program included: reports by councils, presentations on "Global 2000 — The Canadian Perspective", "Incremental Environmental Disturbance", and "Security of the Agricultural Land Base". The presentations were followed by workshops on the latter two subjects, plus "Role of the Public in Government Decision Making on Environmental Matters". The workshops led to plenary discussion and acceptance of resolutions which are described in Annex 9.

1982 Assembly

This meeting was held in Nova Scotia, June 7-9, and was hosted by the Nova Scotia Environmental Control Council. All

jurisdictions except British Columbia, Québec, Yukon and Northwest Territories were represented. Nine members of the Canadian Environmental Advisory Council participated.

The program included: reports by councils; presentations on "Surface Mining in Nova Scotia and Environmental Issues", "Environmental Impacts of Renewable Energy Sources" and "Environmental Education"; a panel discussion on "Global 2000" as a follow-up to a presentation at the 1981 Assembly; and an impromptu workshop on the nature of future joint meetings.

This Assembly was planned to be one of discussion only, without resolutions. However, the councils agreed that the program of future meetings should include adoption of resolutions or recommendations to provide a focus for discussion and further action.

1983 Assembly

At the 1982 meeting in Digby it was agreed that the 1983 Assembly would be held in Ottawa and hosted by the Canadian Environmental Advisory Council. Mid-way through 1982, Council appointed a planning committee to coordinate arrangements for the joint meeting.

Council initially proposed that the major part of the Assembly be held in the form of a workshop on the theme "Environment and Sustainable Development". Suggestions from provincial councils prompted a change to a two-theme meeting, "The Public Role in Setting and Enforcing Environmental Standards" and "The Role of Environmental Councils".

Preparations were well underway by the end of the fiscal year. A report on the 1983 Assembly will be included in the 1983-84 Annual Review.

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March 31, 1983

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Dr. Peter Meincke University of Prince Edward Island Charlottetown, Prince Edward Island

Secretariat

Mr. Max McConnell, Executive Secretary

Dr. E. Fred Roots, Science Advisor

Mrs. Veena Halliwell, Administrative Assistant

Environment Canada Ottawa, Ontario K1A 0H3

LIST OF PUBLICATIONS

Annual Review 1973-1974. Part A — Activities 1973-1974 by Arthur Porter. Part B — Problems and Priorities in the Canadian Environment by Pierre Dansereau.

Annual Review 1975. Part A — Activities 1975 by Ian McTaggart-Cowan. Part B — Significant Canadian Environmental Problems by J.P. Nowlan.

Annual Review 1976. Part A — Activities 1976. Part B — The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A - Activities 1977-1978. Part B - The State of the Canadian Environment.

Annual Review 1979-1980. Activities 1979-1980. A Decade of Environmental Concern: Retrospect and Prospect by Donald A. Chant. Environmental Assessment and Review Process: Observations and Recommendations.

An Environmental Impact Assessment Process for Canada. Council Report No.1, February 1974.

An Environmental Ethic — Its Formulation and Implications. Council Report No. 2, January 1975. By Norman H. Morse.

Harmony and Disorder in the Canadian Environment. Occasional Paper No. 1. By Pierre Dansereau. Council Report No. 3, 1975.

Environmental Aspects of Nuclear Power Development in Canada. Occasional Paper No. 2. By H.E. Duckworth, H.W. Duckworth, Arthur Porter and J.S. Rogers. Council Report No. 4, 1977.

Towards an Environmental Ethic, March 1977, By D.A. Chant.

Report of the Second Joint Meeting of Environmental Advisory Councils. May 1977, Fort San, Saskatchewan. Council Report No. 5, March 1978. Produced in collaboration with the Saskatchewan Environmental Advisory Council.

The Management of Estuarine Resources in Canada. Council Report No. 6, March 1978. By Irving K.Fox and J.P. Nowlan.

Reports of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council. Council Report No.7, May 1978.

Ecotoxicity: Responsibilities and Opportunities. Council Report No. 8, August 1979. By Ross H. Hall and Donald A. Chant.

Report of a Meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Council Report No. 9, April 1981.

A New Approach to Pest Control in Canada. Council Report No. 10, July 1981. By Ross H. Hall.

Wildlife Conservation Issues in Northern Canada. Council Report No. 11, October 1981. By Ian McTaggart-Cowan.

Water Management Problems in the Third World: Lessons for Canada. Council Report No. 12, March 1983. By Peter F.M. McLoughlin.

A NEW APPROACH TO PEST CONTROL IN CANADA

by Ross H. Hall

ABSTRACT

Pesticide application has become an integral part of agriculture and forestry technique. Its use in Canada has risen dramatically since 1940 and herbicides account for 50 percent of the pesticides used, but exclusive reliance on chemicals is facing serious problems. The number of resistant pests is increasing and the number of new pesticides introduced on the market has declined.

Pesticides are deliberate environmental poisons with profound effects on organisms other than the target, yet we lack a fundamental understanding of environmental impact. Few registered in Canada have been subjected to the full gamut of known environmental tests.

With no Canadian pesticide industry, no pesticides are developed specifically for domestic pests. Supporting information for registration is furnished by the manufacturer. Test protocols have been developed for, and testing carried out in other countries. Canada has no control over the testing facilities, or access to information accumulated by the industry.

Environment Canada examines only cursorily the environmental effects of registered pesticides, has no systematic monitoring program and is not privy to all pesticide information in the files of Agriculture Canada.¹

Alternative, non-environmentally damaging control strategies such as biological control, changes in cultural practices or introduction of specific pathogens shift the emphasis from exclusive reliance on chemicals. Integrated Pest Management (IPM) attempts to reduce pest damage using a more sophisticated, multi-technique approach. Successful implementation of IPM and biological techniques on a large scale can be achieved only if producers are assured that no economic dislocation will result. The proper economic and political decisions would permit Canada, with its substantial body of expertise, to minimize the use of chemicals in favour of control techniques designed in Canada for Canadian conditions.

This report suggests four options: i) to do nothing risks continuing environmental damage; ii) to tighten up Environment Canada's role under the Pest Control Products Act would force more rigorous imposition of environmental criteria; iii) to transfer administration of the Act to Environment Canada would help to ensure that environmental rights are more effectively represented; iv) to create a Commission, jointly administered by the Departments of Environment, Agriculture and National Health and Welfare, empowered to examine pest control problems in their totality. It would focus the regulatory mechanism on the problem itself and all the alternatives for its resolution, and have the power to regulate control strategies. The Canadian Environmental Advisory Council recommends this option.

¹ The responsibility for registration of pesticides lies with Agriculture Canada under the Pest Control Products Act.

WILDLIFE CONSERVATION ISSUES IN NORTHERN CANADA

by Ian McTaggart-Cowan

ABSTRACT

The Yukon and Northwest Territories together comprise some four million square kilometres and primitively supported a population of perhaps ten thousand aboriginals living as hunter-gatherers. This population has tripled and continues to increase at about 3.9 percent per annum.

This much larger population retains a preference for wild meat and fish as major parts of its diet. Whereas in primitive times, the technology and hunting techniques probably did not permit the subsistence user to make a serious impact on the wildlife food resource, other than some species in some places, the people are now equipped to impose serious overkill. Up to the end of the 17th century, the numbers of people were roughly regulated by the availability of food animals, but the situation is now reversed. Caribou, moose and grizzly are especially vulnerable.

While this increasing population, with improved mobility (skidoo and aircraft hunts) and modern weapons, ammunition and rifle sights, is putting wildlife under heavy pressure, industrial development is introducing new levels of disturbance.

Urbanization, the availability of the work and welfare society, the movement to establish land claims and to assert the right to kill wildlife at pleasure are factors complicating the search for an adequate conservation strategy.

It has been suggested that the territorial wildlife offers potential for limited commercial exploitation. The writer can see no evidence that this is possible; indeed, sharply reduced kills of caribou and beluga are imperative.

In the Northwest Territories, there is a move to transfer all responsibility for wildlife management to the local Hunters and Trappers Associations. While it is important that the user

groups participate in the designing of regulations, it is essential that management be based upon facts obtained through scientific research. The territorial administrators must retain the authority to make decisions derived from a consideration of established data and use this knowledge to bring about effective management.

Some caribou herds migrate from wintering areas in the provinces to summer ranges in the tundra and pass through at least two administrative districts and two or more subsistence hunting grounds. Under such circumstances, local hunter-trapper groups cannot determine tolerable levels of kill or manage such stocks in their own long-term best interests.

Alaska, Yukon, the Northwest Territories and Québec are each moving along different paths in the search for conservation/management approaches which will meet the new needs.

The basic goals of wildlife conservation are the same in the North as elsewhere, but managers of northern wildlife are facing completely new situations requiring novel strategies. Gaining the understanding and cooperation of the Inuit and Indians is one prerequisite to a successful strategy, but it must be matched with research, monitoring and the application of well designed management principles and practices.

The support of all levels of government and the cooperation of the Yukon and Northwest Territories wildlife administrations, the Canadian Wildlife Service, the Department of Fisheries and Oceans, the provincial bodies as required, and the subsistence users are essential if the conservation of northern wildlife, and the preservation of a way of life, are to be achieved.

WATER MANAGEMENT PROBLEMS IN THE THIRD WORLD: LESSONS FOR CANADA

by Peter F.M. McLoughlin

SYNOPSIS*

Despite the economic, social and cultural, institutional and environmental differences between countries and between different parts of the world, water is a resource vital to all: The management of water resources raises issues which affect, and reflect, a wide range of the environmental, social and political or institutional problems of every country. It is the purpose of this paper to stimulate discussion on fundamental issues of water management in Canada, through the lessons to be learned from the experiences of the Third World.

In Asian, African, Latin American and Middle East countries, water resources are in general less abundant than in Canada, and often of lower quality; the direct social need is greater but the ability to pay is less; and the effects of a variety of institutions and customs are more sharply apparent. Water resource development and management figures prominently in international assistance programs, bringing into focus problems of differences in concept and objectives between donor and recipient, between planner and implementer, between traditional practices and new technologies, between short-term results and long-term consequences. A review of examples of these experiences may help Canadians improve the management of their own water resources.

Twelve distinctive, but often interrelated aspects of presentday water resource management issues in the Third World have been selected for discussion:

Inappropriate Scale of Technology: The tendency of engineers, planners and politicians to seek, and support, large-scale, conspicuous projects and solutions often results in developments which are environmentally and socially inappropriate, and unsupportable economically. Use of large-scale technologies in one part of a water-resource management scheme leads to the need for large-scale adjustments through the social and economic system — a large dam, for example, tends to lead to massive irrigation projects, which necessitate re-organization of traditional small farms into large enterprises, in turn calling for integrated investment and marketing systems, increased government bureaucracy and control, etc. — none of which may have been needed had the original problem been approached, at less total cost, through the building of one hundred small dams.

 \star The complete paper will be published, under the same title, as Canadian Environmental Advisory Council Report No. 12.

Technical/Bureaucratic Bias in Water Planning: Almost all water management projects are conceived and planned by engineers in government agencies or large corporations, and designed and implemented within a large bureaucratic system. This combination of agency engineer and bureaucrat results typically in omission of adequate consideration of important local economic, social and environmental factors from the early stages of project planning, or in dealing with them only as required by law. Thus "non-technical" matters tend to remain outside the normal considerations of planning, or to be looked on as an unwelcome constraint on project technical design and implementation, instead of as an integral part of the design or as often the basic reason for undertaking the project.

Water Management Planning in Isolation: Although a resource such as water, in which the entire community has a stake, has a multiplicity of end uses, bureaucratic planning for development of the resource tends to focus on one or a few technical uses — say water power, or irrigation — and to ignore the diversity of the institutional, legal, and social aspects that will be affected. In many cases the agency responsible for project planning has no authority or capability to consider the full range of issues and impacts that will result from implementation of the project.

Planning that Neglects Long-Term Effects: Planning for development and use of water resources must not only provide short-term management, but must take into account the behaviour of affected physical and biological systems over the long-term. Short-term solutions to local water problems may further stress an already strained natural system, so that in 10-15 years the system collapses and all concerned are worse off than ever.

Damage to other Resources: Because water is pervasive in virtually all natural features and processes as well as all man-made systems and establishments, use or control of water resources is bound to affect many other resources. Unless planned very carefully with awareness of the total impact of hydrological changes, the effects of even modest water projects have negative implications for other resources.

Jurisdictions and Water Rights: Most Third World water resources projects are in areas that have been populated for a long time, and where the rights and jurisdictions over water are an intimate part of the traditional culture and institutional system. Decisions made by a central authority to re-arrange or re-distribute water, to flood land or prevent annual flooding, to control groundwater extraction through centralized wells, etc., must necessarily extinguish or override traditional and local rights and apportionment systems. Thus water resource development, intended to improve social or economic conditions, may lead to social problems and damaged cultures.

The Dynamics of Water Supply: Water planners, whose projects are intended to have effects that last decades, must take into account the factors that change water supply. These factors may be natural, such as variations and instabilities in regional or world climate, or they may be caused by human activities, such as the accelerated run-off due to more intensive cultivation and grazing, erosion from forest clearing, etc. It is a major challenge to design and operate water projects to cope with the enhanced instabilities, without the projects themselves adding to them.

Not Learning from Previous Experience: Water resource planning and development experience often is not accumulated from one project to another, especially in the Third World, for many reasons. The engineers and authorities who conceive and build the projects are not the people who have to live with the results; information on project performance is not systematically gathered and, especially on failures and faults, rarely widely distributed; mistakes are not advertised by either politicians, engineers, or development agencies.

Accountability of Managers and Planners: An underlying obstacle to improvement in water resources planning and development is that the planners and development decision-makers are rarely held accountable for their mistakes. Accountability is difficult to assign and enforce because of many of the factors already noted, to which may be added problems resulting from the mixture of political and international financing arrangements that determine development decisions; the short time frame of concerns of most politicians and bureaucrats compared to the long-term effects on the environment and people at large; and the difficulty of censuring or penalizing a donor for incompetence without risking loss of further donations

Shortage of Skilled Resources and Finances: A pervasive problem of water resource development in Third World countries is shortage of skilled manpower, domestic financial resources, and international exchange resources. The skilled manpower shortage in some regions is so acute that training programs set up for a particular project often result in a flow of trained people to other regions or countries where job incentives are greater. Mechanization or modernization of water supplies, even if the initial investment is donated,

often result in a continuing drain of the country's finances for fuel, maintenance, etc., which will not be met by direct revenues from increased production or social improvement.

Absence of Economic and Social Analysis: Each country has its own list of national priorities, into which water resources development must be fitted. The priorities and concerns of international aid agencies and donor countries may differ from those of the recipient country, particularly as regards the role of water resources in relation to food production, social welfare, and international stability. These various priorities make it advisable for developing countries to have a national water development plan, which can be a means of ensuring that productive, usually smaller and locally sensitive projects, are not neglected or swept aside by the politically conspicuous but often uneconomic and doubtfully beneficial major projects.

Incrementalism: Each water use or water resources development project, no matter how small or local, affects the larger systems. Changes in flow and distribution, water quality, or sediment load, undertaken for specific beneficial purposes, nearly always result in changes elsewhere in the hydrological system, and those changes are nearly always detrimental to the usefulness of the total resource

Application of Observations from the Third World to Canadian Water Resource Development

Canada's approach to water management and use has been conditioned by a surfeit of availability over demand. Even though some aspects of water resources are seen as current problems — acidification and eutrophication of lakes, falling water table in prairie areas; and although it is recognized that industrial, domestic and agricultural activities have put in jeopardy the medium and longer-term quantity and quality of this resource, the demand for water of good quality continues to grow at an almost exponential rate in Canada. Economic and resource planners still accept increasing water demands as a normal condition for a developed country.

It would be prudent for Canada to benefit from the recent experiences of Third World countries and avoid some of the mistakes that have been made. The lessons from the Third World should prompt Canadians to ask themselves questions like the following:

- Is Canada succumbing to the megaproject philosophy, and inclined to favour very large water and power projects, even though smaller ones are in many cases more efficient and a better use of total resources, in both an economic and environmental sense?
- Are we addicted to centralized water supply and sewage systems, in part because of the investment and institutional

structure that we have developed, when numerous smaller systems have many environmental, social and economic advantages?

- Has Canada created a bureaucratic and engineering bias by establishing water and power authorities, and by development specialists being insulated from changing social needs and from the effects on other resources and the environment?
- Have we built-in obstacles to considering, in a balanced way during the planning of water-resource development, the impacts that development projects will have on other resources and on other sectors of the economy?
- Have we neglected to accumulate a base of data and experience, from projects undertaken to date, that can be applied to long-term planning?
- Have we used available legislation to ensure that water management decisions do not contravene established rights and jurisdictions? Or do we use the specific-purpose legislation to achieve single-purpose projects and avoid interference from other concerns?
- Do we use the best available environmental data and methodologies in water planning and decisions? Does our

- information base include, and allow us to select what is useful from, traditional wisdom and experience?
- Are Canadian politicians and planners accountable for major water management decisions, and required to answer when projects do not meet expectations?
- Has Canada developed national or regional water management plans or strategies that encompass the full range of water resource needs and uses?
- Is Canada setting in place a process to counteract the incremental and progressive stresses put on water resources and the environment by successive or incremental developments that use or contaminate water?

Conclusion: A review of Canadian practices, in the light of recent experiences of the Third World with regard to water-resource decisions and developments, suggests that Canada has fallen into bad water management habits which it must change if it is to continue to be blessed with ample water of good quality. Other nations, especially poor nations, provide lessons and guidance in the planning and management of this most vital resource. Canada should heed those lessons and be guided, where appropriate, by the experience of others.

AN OVERVIEW OF CURRENT TRENDS AND THINKING REGARDING THE SUSTAINABILITY OF THE PRODUCTIVITY OF FARMED LANDS WITH EMPHASIS ON WESTERN CANADA

by C.F. Bentley and L.A. Leskiw

EXECUTIVE SUMMARY*

Soil degradation and loss of arable land from agriculture are issues that are not normally thought of as having a high profile from an environmental point of view. Yet these issues are now creating a growing level of concern in many areas of Canada as more and more evidence points to diminishing levels of native fertility and the mounting losses of some of Canada's most productive farm land.

In an effort to obtain a comprehensive overview of these problems, the Canadian Environmental Advisory Council commissioned Dr. C.F. Bentley, P. Ag., and Mr. L.A. Leskiw, P. Ag., to provide a background paper on the issues and concerns now surfacing with respect to the broader impacts of land use and soil quality. The Bentley-Leskiw report leaves no doubt that in many areas, current land usage is such that unless effective remedial measures are taken very soon, future agricultural production potential will be dramatically curtailed. Unfortunately, efforts to correct the problem areas are being hindered by continued myths about a presumed high level of both quantity and quality of agriculturally suited land in Canada.

In their overview of the problem, Dr. Bentley and Mr. Leskiw identify three specific problem areas. First, they cite a growing list of productivity concerns falling largely within the domain of the farmer. These include issues such as salinization, soil erosion, depletion of soil organic matter and plant nutrients, inappropriate cropping and soil management systems, soil acidification, and soil compaction.

Salinization, the accumulation of injurious quantities of soluble salts in surface layers of the soil, is a condition which has plagued irrigated agriculture for thousands of years. It is a problem of growing concern in Western Canada where rough estimates suggest that salinization may now be spreading at the rate of some ten percent per year.

Soil erosion, in particular the loss of fertile top soil through wind and water is also a serious concern, especially since it is so difficult to precisely measure such losses. There is little doubt, however, that the direct losses from soil erosion are very significant, as are the side effects of soil erosion, air and water pollution, eutrophication of lakes, clogging of drainage systems, etc.

Organic matter depletion and loss of key plant nutrients are also singled out as concerns which are mounting each year as inappropriate cropping practices fail to offset the annual nutrient losses associated with each year's production.

Other areas of soil degradation such as acidification and soil compaction also continue to show signs of becoming serious problems as farmers attempt to compensate for soil fertility losses through use of more intensive farming practices, including higher uses of nitrogen fertilizer.

While each of these issues are mainly within the domain of the farmer, the authors suggest that remedial action will require assistance at many levels. This could include greatly expanded research efforts to suggest ways of overcoming the problems, coupled with imaginative government policies designed to place greater emphasis on longer return profitability goals rather than the short-term profit strategy that most farmers must follow in order to survive on a year-to-year basis.

A second specific problem area in terms of longer-run sustainability of agricultural production relates to a number of issues that are primarily within the public domain. These include land use regulations, conversion of agricultural lands to other uses, toxic contaminants and land disturbances such as strip mining.

Land use regulations, in particular, are singled out as a subject of major concern as increasing amounts of prime agricultural land are diverted to other uses, frequently without a future recovery option for farm use. Despite Canada's massive land base, only eight percent of this land is suitable for continuing arable agriculture. Less than half of one percent of this total can be classed as excellent to very good and most of such land is situated in the highly populated corridors where alternative land use schemes are rampant. As we lose our prime farm land, we are forced to increasingly fall back on far less productive land — and there are serious economic limits to how far we can go in this direction. Clearly, some means is needed at the public policy level to stem the frequently irreversible flow of land from agricultural use.

Strip mining and other land disturbances, while affecting smaller areas, also have the potential for reducing our future

^{*} Prepared by H.D. McRorie, the member of Council who guided Council's studies on sustainability of agricultural soils.

agricultural land base. With a responsible public policy approach, however, much of this damage can be alleviated or offset. The key to informed public policy making in the future would appear to lie in the need for education, research and extension along with an imaginative set of policies designed to look at the needs of future generations, rather than to simply respond to short-run aberrations in the market system.

Natural or external factors are identified by the authors as the third problem area in terms of sustained agricultural production. In this respect, they note that soils, climate and the demographic characteristics of farm population have a substantial impact on the types and success of farming in different agroecological regions. While many of the challenges

posed by these external factors are beyond the direct control of either the public at large or the individual farmer, much can be done by recognizing the restraints posed in this area, and by then developing management and policy programs which both maximize the opportunities and minimize the potential losses.

The overview by Dr. Bentley and Mr. Leskiw clearly points out the need to invoke programs and policies which will help to ensure that our agricultural production base can be sustained in the longer run — a situation that is far from assured at this point in time. The challenges are substantial but the consequences of not achieving success in this area are many times more significant.

A PERSPECTIVE ON THE CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

by J.K. Fraser

In 1970, responding to an increasing awareness that the resource base of the Canadian economy was in peril because of unregulated exploitation and lack of control, the Canadian government established the Department of the Environment. This Department is responsible for weather reporting and meteorological research, for the federal regulatory aspects of pollutants and toxics, and for national policies dealing with wildlife, forests, lands, parks and water resources. Thus not only does the Department provide certain services demanded by the public, but it contributes to the well-being of the nation through programs designed to manage the development of resources. Furthermore, as one of the few agencies concerned with the future of the environment, the Department must continually seek to influence other ministries to keep environmental considerations in mind in the formulation of their programs and policies.

For some years Canada had secured advice on scientific and economic matters from bodies such as the Science Council and the Economic Council. Recognizing the value of a source of expert, independent and impartial counsel on environmental matters, the Minister of Environment, in 1972, appointed an Environmental Advisory Council, composed of up to sixteen members drawn from the general public.

Being neither a public interest group nor an agent of any group, nor a part of the Department, but the Minister's advisory council reporting directly to him, the prime role of the Council is to advise the Minister, and as appropriate, the Department and the public, on matters of environmental concern, speaking as independently and forthrightly as possible. This advice may take numerous forms, including considered responses to requests for advice, acting as a source of informed opinion or of public reaction, identifying the consequences of government action or inaction, anticipating potential problems, drawing attention to gaps or inadequacies in environmentally-oriented research, stimulating the appreciation of interrelationships between environmental and other policy areas, and encouraging the holistic and long-term approach to resource use. The Council considers that its mandate of provision of advice extends beyond the jurisdiction of the Department of the Environment, beyond purely federal concerns, and beyond Canada.

The relationship of the Council with the Department has changed in recent years, especially in the acceptance of the invitation to participate in reviews of policies on scientific research, public participation, and the role of the Department in northern Canada. While recognizing the financial, personnel, political and jurisdictional constraints to the Department's activities, Council is able to bring an external, objective view of priorities into the ongoing attempt to make the optimum use of limited resources.

The composition of the Council is important to ensure effectiveness. Each member is appointed to serve in a strictly individual capacity. The members should have sufficient technical knowledge and experience to enjoy professional and public respect, yet sufficient breadth to contribute critically to a wide range of topics, and enough control over their time to be able to devote interest and effort to the activities of the Council. As a whole, the members should be able to provide an assemblage of interests and knowledge of the range of environmental issues in Canada, and be sensitive to and familiar with conditions and attitudes in all parts of Canada. From experience, it appears useful to strike a balance in membership between the academic and business communities. As well as providing corporate advice produced through Council deliberations, members may act as individual advisors.

Advice to the Minister has varied from formal recommendations for action to simple expressions of concern, and has spanned a broad spectrum of environmental concerns, including: the organization and mandate of the Department, funding of citizens' groups, native rights claims, endangered species, air and water quality, the management of estuaries, the impact of open pit mining, spruce budworm spraying, shore zone management, the Migratory Birds Act, ecological reserves, the environmental aspects of foreign aid, a new National Park on Ellesmere Island, biotechnology, a pollution-free community concept, control of access to Kluane Park, and land use policies.

Periodically, Council has undertaken studies and published reports on issues of particular concern to Council. Subjects have included: the formulation of an environmental ethic, a treatise on harmony and disorder in the Canadian environment, ecotoxicity, pest control, and wildlife conservation issues. The Council's annual reviews contain reports on the Environmental Assessment and Review Process, reclamation of coal mining lands, and overviews of the state of the Canadian environment.

Council took the lead in bringing environmental public interest groups together by organizing a series of meetings which eventually culminated in the formulation of a departmental policy of public participation in planning and policy-making. Another initiative was the organization of an assembly of environmental advisory bodies, which most provinces have in one form or another. These annual conferences have been hosted by six provincial councils as well as by the federal council. They provide an opportunity for the councils to discuss matters of common environmental concern and to formulate resolutions which carry the weight of endorsement by a nationwide group of concerned environmental advisors.

ROLE OF THE CANADIAN ENVIRONMENTAL ADVISORY COUNCIL*

- Identify important Canadian environmental problems, concentrate on the definition and analysis in principle of their biological, physical and social aspects and generate independent advice for the Minister on the best routes to be followed toward their solution.
- Identify and define environmental problems of a more global nature:
 - a) which Canada shares with neighbouring countries; and
 - b) which affect Canadians as members of the world population.
- Receive requests and instructions from the Minister on environmental issues and actions, and respond with advice and recommendations.
- Anticipate and identify emerging issues and bring them to the attention of the Minister.
- Examine the environmental implications or effects of government action or inaction on the development of perceived and coherent government policy.
- Keep abreast of current environmental problems so as to be readily responsive to requests from the Minister.
- Evaluate the processes of environmental assessment and control so as to be able to identify apparent successes and failures and to propose improvements in their procedures and coordination.

- Communicate with the Canadian public on environmental issues and provide a focus for the expression of their concerns.
- Provide the Minister with independent views on the performance of the Department in meeting its responsibilities.
- Work with the Minister and the Department in support of non-governmental environmental groups.
- Maintain liaison with the provincial and territorial environmental councils.
- Produce, as part of an annual report, an overview of the successes and failures of environmental activities in Canada, the lessons and the perceived issues.

Being neither a public interest group or an agent of any group, nor a part of the Department, but the Minister's advisory council reporting directly to him, the role of the Council is to speak as independently and forthrightly as possible. It is not simply to tell the Minister or the Department or the public of Canada pleasant, uncontroversial things but to "tell it as we see it" and thus at times its comments may be irritating, unpleasant or embarrassing.

^{*} This statement was adopted in October 1981. Subsequent discussions during the latter part of the period covered by this Review were expected to lead to preparation of a revised statement.

RESOLUTIONS OF THE 1981 ASSEMBLY OF ENVIRONMENT COUNCILS OF CANADA

Role of the Public in Government Decision-Making on Environmental Matters

	Topic	Resolutions
1.	Public should not be confined to participation at election period only	Promote public participation on a continuous basis.
2.	Decision-making process too centralized	Promote creation of environmental groups at local and regional levels.
3.	Lack of direct and indirect financial assistance for public participation	Provide indirect assistance such as typing, photocopying etc. Provide direct assistance such as: proponent allows a percentage of project cost to assist groups research money from all sources core funding to keep groups alive (on a matching basis) specific project and hearing funding.
4.	Lack of adequate information to public	Provide information in less technical and more understandable form for access by the general public. Freedom of information legislation. Public should have access to information collected by Government agencies; recognizing some would be confidential. Provide assistance to the public to help them identify issues and concerns.
5.	Decisions by political authorities are based too much on short-term benefit	Need long-term planning on environmental issues. Public should be able to participate in this process: - examine policy papers - allow public to participate in developing alternatives. Use of issue hearings to draw people into discussion of long-term impacts.
6.	Difficulty for public groups to maintain credibility without adequate resources	
7.	Public involvement is mainly channeled into specific projects or development; not enough in planning or long-term planning	Environmental non-governmental groups, because of their long-term views, should have input in policy formulation.

8. Public involvement is usually late in the decision-making process

Public should be consulted before decision is taken as to the preferred alternative.

Involvement of the public should be sought early and throughout the process until final decision.

 Much emphasis is on public hearings while many decisions are taken outside that mechanism — concern that there are no allowances for public input at these other levels People should be educated on how to get their message to elected people and bureaucrats.

10. Advisory Councils and Hearing Boards are good mechanisms for public participation in decision-making but are not the only ones

Environmental non-governmental organizations should be recognized and encouraged.

11. Environmental implications should be evaluated not only sectorially but comprehensively, with socio-economic implications

Socio-economic implications of environmental policies and the environmental implications of socio-economic policies should be integrated in the total planning and decision process.

12. Not enough notice of issues to public

Use other mediums than official Gazette.

13. Limited public input into legislation and regulations

Provide the public with draft copy of proposed legislation and regulations.

Where any particular groups are consulted, volunteer public groups should also be consulted.

Final decision should include explanation of how input was considered.

14. General topic

The socio-economic implications of environmental policies and the environmental implications of socio-economic policies should be integrated in the total planning and decision process.

That public involvement in the decision-making process begin early and continue throughout.

15. Mechanisms: public hearings

That, depending on the type of public meetings or hearings, but definitely in the case of judicial and quasi-judicial hearings, adequate financial and other resources be made available to intervenors to allow full participation; and feedback mechanisms be incorporated to ensure that participants know that their concerns are heard and considered even if not acted upon.

16. Assistance to groups

That the Councils should help in actively exploring various means, both direct and indirect, of having improved assistance provided to appropriate individuals and organizations.

17. Information

That, as a general principle, information collected by public servants with the exception of clearly defined proprietary information, must be available to the general public.

As a necessary part of access to information, it is also essential that a list of relevant existing information be available.

18. Legislation and regulation

That citizen input be sought at the appropriate draft stage(s); and that where any particular interest groups such as industry are consulted, so should the public be consulted.

Incremental Environmental Change

Incremental environmental changes (IEC) were defined to be those man-made visible or invisible alterations to the environment which, when accumulated over time and/or space, have greater effect than any increment *per se.* IECs may lead to irreversible environmental conditions.

Topic

Resolutions

1. Incremental environmental change

That each event be placed within the long-term dynamics of the environment with respect to superimposed cycles and other environmental fluctuations.

That more effort be put on identifying the nature, sources and magnitude of IECs on biota; it must include additional research on the effects of making compatible the various data bases.

That wherever possible, proposed activities should include a probabilistic risk analysis.

That emphasis be given to follow-up monitoring of IECs to evaluate previous predictions, so as to improve forecasts for contemplated events.

That more public hearings should be encouraged, to elicit anecdotal local information and to educate all agencies involved.

That standards and/or objectives for air and water be reviewed periodically to take account of IEC information.

The Security of the Agricultural Land Base

Topic

Resolutions

Data base

A priority need is an improved data base. The CLI (Canada Land Inventory) needs expansion and refinement, with priority to the agricultural inventory. CLI needs expansion to include:

a) additional agri-climatic information

- b) productivity indices
- c) identification of suitability for crops and cropping systems

The provincial and federal governments should cooperate to improve and standardize the data base. The Lands Directorate of the Federal Department of Environment should take a leadership and co-ordination role.

2. Agricultural research

There is a need to expand agricultural research and evaluation of production practices to identify the impact on long-term sustainment and enhancement of agricultural productivity within environmentally appropriate and economically viable parameters. For example, there are fewer researchers on the effects of pesticides today than there were a decade ago, though the impacts of pesticides are matters of greater concern today than in the past.

Research should be directed towards the effects of present agricultural practices and the alternatives that could be adopted. The research approach should be underlain by the concept of stewardship: practices should be directed to turning land over to successors in as good or better condition than received. The focus of research should be to identify practices that would do so while still providing an adequate income to farmers. The federal and provincial departments of agriculture are the appropriate bodies to provide leadership in undertaking this research.

3. Innovative Techniques

Many nations have adopted alternative policy approaches to the preservation of agricultural land. Various approaches such as sale of development rights, incentive and taxation programs have been developed with varying degrees of success.

We believe that convening of a national workshop/conference to look at alternative approaches adopted throughout the industrial world would be extremely useful. The intent of such a workshop/conference would be to identify those techniques and approaches developed elsewhere that could be used in Canada, either directly or with suitable modifications. The product of such a workshop/conference would be to identify alternative approaches to the preservation of agricultural land in Canada.

The Canadian Environmental Advisory Council (CEAC) should arrange for the preparation of a discussion paper on innovative techniques in advance of a workshop/conference.

The workshop/conference should be convened by appropriate agencies to indicate broad-scale federal-provincial support for this approach.

4. Short-term program

Security of the agricultural land base is an immediate and urgent problem, because of the existing scale of loss, the likelihood of it continuing if no action is taken and the severe consequences of continuation. Action cannot wait for the completion of action identified in resolutions 1 to 3.

- a) CEAC should be requested to prepare a prospectus on the security of the agricultural land base across Canada.
- b) There is a need to develop public awareness programs on the existing information base, directed to urban consumers, government departments, farm organizations and politicians.

Such programs should be developed at many levels – federal, provincial, municipal, environmental councils, and wherever interest can be generated.

Ecological Reserves

Topic

1. Ecological reserves

Resolutions

Resolution adopted unanimously by the representatives of environmental advisory councils at Banff, June 4, 1981.

That the advisory councils express concern that no action has been taken with regard to the establishment of a national Ecological Reserves Co-ordinating Committee.







1983-84

Canadian **Environmental Advisory** Council

Review of Activities





Canadian
Environmental
Advisory

Council

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary Canadian Environmental Advisory Council c/o Environment Canada Ottawa, Canada K1A 0H3

Ce rapport est disponible en français

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council (CEAC) was perceived, at the time of its founding in 1972, as a means to promote communication and understanding among diverse interest groups in society, and between those groups and the Minister of the Environment. The practical means of implementing this role focused primarily of the provision of advice by the Council to the Minister of the Environment.

The role and manner of Council's operation which have evolved since that time under several ministers have reflected the original concepts, but have also enlarged on them and made them more specific.

Council today is a body representing a cross-section of Canadians who are knowledgeable and concerned about the environment including social and economic ramifications. It operates in a confidential advisory capacity to the Minister of the Environment, providing judgemental, considered opinion which reflects the viewpoints of a wide spectrum of the public. It provides the Minister with an alternative to the advice provided by the Department of the Environment and other federal agencies, and to the advice of specific interest groups.

It has been clear throughout Council's history that it was intended to serve as an advisory body to the Minister rather than as an organization with a high public profile, taking and promoting positions in public forums Council's public role, in terms of activities such as the publishing of reports, has therefore been secondary to its primary function of providing advice to the Minister of the Environment on a confidential basis. The public role has been played only when such action did not compromise but supported the main responsibility of advising the Minister.

The spirit in which Council operates is exemplified by the following statement which appeared in a 1981 description of the role of Council.

"Being neither a public interest group or an agent of any group, nor a part of the Department, but the Minister's advisory council reporting directly to him, the role of the Council is to speak as independently and forthrightly as possible. It is not simply to tell the Minister or the Department or the public of Canada pleasant, uncontroversial things but to "tell it as we see it" and thus at times its comments may be irritating, unpleasant or embarrassing."

Ottawa, Canada K1A 0H3

August 22, 1984

Minister of the Environment Ottawa, Canada

Dear Minister:

I am pleased to transmit to you the Review of Activities of the Canadian Environmental Advisory Council for the 1983-84 fiscal year. This document carries out the intention, noted in the previous review, of reporting on an annual, fiscal year basis.

The Review contains a record of major Council activities during the 12-month period from April 1, 1983 to March 31, 1984. It also includes, as annexes, copies of several of the more significant statements prepared by Council during the year.

Council continued an active program in 1983-84, and addressed a wide range of environmental and environment-related issues. I would like to note, in particular, Council's initiatives in the field of environment-economy relationships. It is the view of your Council that economic performance and environmental quality are inextricably linked; that, from a long-term perspective, the health of the Canadian economy will be a reflection of the state of Canada's natural environment. We expect that our initial, exploratory efforts in this field during 1983-84 will be continued as a priority activity in future years.

Yours sincerely,

Tom Beck

Tom Beck

Chairman

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COUNCIL OPERATIONS

Membership

Several concerns regarding membership were discussed with the Minister during the year. Accordingly, an effort was made to project a future schedule of appointments that would ensure continuity and that the regions as well as those disciplines and interest groups concerned with current issues would be adequately represented on the Council. A balanced schedule of appointments was also projected to avoid major changes in Council's make-up during any one year. At the same time, the schedule would reflect the Minister's desire that emphasis be placed on attracting new members to serve on Council rather than relying on the re-appointment of current members. Through discussions with the Minister, it was also agreed that because of budgetary restraint, membership should be held at a maximum of 12 rather than the full complement of 16 members.

Council was faced with the possibility of losing 7 of its 11 members during the year because their terms of appointment would be completed. To reduce the size of the turnover, the appointments of two members were extended for one year. Three new appointments were made, leaving Council with a total membership of nine. Other appointments were under consideration at year-end.

Mr. Tom Beck of Calgary, Alberta continued as Chairman during 1983-84, and Dr. P.F.M. McLoughlin of Comox, B.C., served as Vice-chairman. Dr. Robert Bergeron of Chicoutimi, Québec, also served as Vice-chairman prior to completion of his appointment.

The following members completed their service on Council during 1983-84:

Dr. Robert Bergeron, Professor, Université de Chicoutimi, Chicoutimi, Québec;

Mr. Alistair Lucas, Professor, Faculty of Law, University of Calgary, Calgary, Alberta;

Ms. Nancy MacPherson, Council for Yukon Indians, Whitehorse, Yukon:

Mr. H.D. McRorie, Director, Agricultural Services, The Royal Bank of Canada, Winnipeg, Manitoba; and

Dr. Peter Meincke, President, University of Prince Edward Island, Charlottetown, P.E.I.

The following new members were appointed to Council during the year:

Dr. Trevor Hancock, M.D., Associate Medical Officer of Health, Department of Public Health, Toronto, Ontario; Mr. B.A. Hubert, President, Boreal Ecology Services Ltd.,

Yellowknife, N.W.T.: and

Dr. Donald Mackay, Professor, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Ontario.

A complete list of members at the end of 1983-84 is included in this Review as Annex A.

Meetings

The meeting schedule was slightly reduced during the year because of budgetary restraint. Five full meetings of Council were held — four of them in Ottawa. The fifth meeting was held in Chicoutimi, Québec, in line with Council's practice of holding one meeting a year in other centres to give members an appreciation of the circumstances and environmental issues in various parts of Canada. The Chicoutimi meeting included a tour and briefing on the Saguenay Fiord and on the endangered beluga population of the St. Lawrence River.

The Minister met with Council during two of the four Ottawa meetings and was one of the guest speakers at the Assembly of Environment Councils of Canada, held in conjunction with the June meeting in Ottawa. (A separate report on the Assembly appears on page 9.) The Minister also met with the Chairman on several occasions, and the Chairman accompanied the Minister on a five-day visit to the Eastern Arctic.

Five executive meetings were held during the year. These meetings were devoted to establishing Council priorities, scheduling activities, and carrying out other Council business.

Committees

The activities of the Northern Committee ended during the year and marked a transition from standing committees to informal working groups. Meetings of the latter were arranged to deal with specific issues through special meetings, correspondence, or telephone conference calls. The latter approach was used on a number of studies during the year.

Publications

A published report is usually the product of a study undertaken either by Council as a whole, by a committee of Council, or by a member, former member, or an independent source on behalf of Council. Reports reflect only a small part of Council's effort. A large part of Council's energy is devoted to providing advice to the Minister in oral or written form. A few statements by Council that were not of sufficient length to merit publication as separate reports are included as annexes to this Review.

Council did not publish any separate reports in 1983-84, partly because of budgetary limitations. However, work was underway on six reports which, it is hoped, will be published in 1984-85. The six reports are:

- Review of Activities 1981-82; 82-83;
- Water Management Problems in the Third World: Lessons for Canada;
- Terms of Reference, Canadian Environmental Advisory Council:
- Report of the Eighth Assembly of Environment Councils of Canada;
- Selected Papers from Assemblies of the Environment Councils of Canada 1975-1980; and
- Sustainability of Farmed Lands: Current Trends and Thinking.

A list of all Council publications to date is included in this Review as Annex B.

Secretariat

No changes in the staff of the Secretariat occurred during the year, although during the latter part of the year, Environment Canada provided the services of the Executive Secretary on a full-time rather than a part-time basis.

The Secretariat concentrated on providing effective support for Council members through research and gathering information on subjects selected for review or study by Council. In addition to carrying out the usual responsibilities for organizing meetings and workshops, the Secretariat was called on to make arrangements for the Assembly of Environment Councils of Canada. The Secretariat also managed contracts for Council studies and contributed to the research and drafting work associated with preparing Council's detailed terms of reference.

COUNCIL STUDIES AND REVIEWS

This section of the report describes activities during the year that either occupied a significant portion of Council's energy and resources, or were considered to be of particular significance. Some topics were of less importance from a Council perspective. These are grouped under the heading "Other". No reference has been made to a number of subjects that appeared on Council's agenda, but which it considered to be either of low priority, or not requiring specific action by Council

Environment-Economy Relationships

Council continued to focus on this broad subject as one of its priorities during 1983-84 and followed up on work undertaken during the previous year. Members felt that a common but false assumption existed that trade-offs are necessary between employment and environmental protection, and that there was a polarization in thinking between environmentalists and economists. Council identified a need to make the case to leaders in all sectors that good environmental practice is good economic practice, and that a healthy economy depends on a healthy environment.

This subject was discussed at two meetings with the Minister, who encouraged action by CEAC. Two projects that were identified as initial steps in Council's long-term program on the subject — preparing a compendium of relevant studies and organizing a major public workshop or conference — had to be postponed because of limited resources. Council did organize two small workshops to explore the subject, and those workshops contributed to Council's main initiative in this field: a submission to the Royal Commission on the Economic Union and Development Prospects for Canada (Macdonald Commission).

Royal Commission on the Economic Union and Development Prospects for Canada

There was concern that the Commission, in recommending future directions for the development of Canada's economy, should have an understanding of the complex relationships between the economy and the environment and that it should recommend courses of action which recognize that a healthy economy is based on a healthy environment.

Initially, it had been proposed that Council review Environment Canada's submission to the Commission. The Minister, however, encouraged Council to submit its own brief directly to the Commission. Council's brief was prepared in a very short period by a small working group. The brief was based partly on the results of two small workshops that had been initially organized to explore the broad subject of environment-economy relations. Subsequently, staff of the Commission briefed Council on its work schedule and on the

findings from the initial round of consultations, particularly the environment-related aspects.

CEAC's brief to the Commission has been reproduced in this report as Annex C. In that submission, Council proposed as an appropriate national goal "the evolution of an economy which is consistent with a healthy environment, an economy which is ecologically sound and which may be enhanced by the application of suitable evolving technologies and management techniques."

Acceptable Risk

The interest of Council in this subject developed from the increased attention being given to assessing both the risks from new products and processes, and their interaction with the environment. The interest was crystallized by a request from the Minister for CEAC's views on the subject, including ways in which public dialogue could be encouraged.

With the assistance of other Council members, a member of Council, Ms. Susan Holtz, prepared the statement that appears in this report as Annex D. The statement draws attention to some of the limitations of risk analysis. It noted that there is a tendency to oversimplify complex scientific questions, and that risk assessment is not reliable as a simple way of resolving contentious policy questions because choices about risk involve ethics and values. In Council's view, the acceptability of any risk involves social and political judgement. Accordingly, while risk analysis or risk assessment may be a useful technical tool for a specific stage in examining a particular risk, it cannot be used to short-circuit the political process of making decisions about the acceptable levels of risk.

Canadian Pesticides Advisory Board

Concern continued among the Council members about apparent inadequacies in the control of chemical pesticides. This concern was highlighted in 1981 by a Council study on "A New Approach to Pest Control in Canada". One of the recommendations of that study was the establishment of a separate agency for regulating these substances. While that recommendation was not accepted, other proposals had been made for changes to the institutional structure for regulating pesticides. These proposals included one by New Brunswick to the 1983 Meeting of Forestry Ministers for the establishment of a "Pesticides Advisory Board". Shortly after that proposal was made, the Minister asked CEAC for its views on an advisory or regulatory agency.

Ms. Susan Holtz, a member of Council with particular knowledge in pesticide control, undertook to prepare, with the assistance of other members, a statement that focused

on the advisory board alternative. While the paper was being prepared, the federal Minister of Agriculture announced that a study on a consultative process related to pesticide registration would be carried out. The CEAC statement, which appears in this report as Annex E, was completed and forwarded to the Minister of the Environment as a contribution to discussion on the role of any such advisory body, regardless of its institutional level or affiliation.

The statement examined the interests of four broad groups — those of the public, governments, industry, and users — in such a board. It also reviewed concerns that would not necessarily be well-served, the board's limitations, and the gaps that such a board or agency could fill. In Council's view, an advisory board could neither meet the expectations of all interest groups, nor fill all the gaps in pesticides control that appear to exist. The statement included a warning that if an advisory board is set up which does not open the registration process to public input and scrutiny, it may create further distrust of governments' regulation of pesticides.

Northern National Parks

During the latter part of 1982-83, Council carried out a study of northern national parks, with particular reference to their economic aspects. This study was prompted both by concern that further delay might prejudice the possibility of designating some outstanding areas as national parks, and in recognition that the 1985 National Parks Centennial was an appropriate time to complete the northern parks system.

The study that Council commissioned on economic aspects was completed. However, because adequate economic data were not available, the study was broadened to include economic data on national parks in general and covered other strategic considerations. A Council statement, based on the study and other documents, incorporated contributions by all members and was prepared by Mr. Monte Hummel. The statement appears in this report as Annex F.

In the statement, Council urged that an initiative be taken toward completing the National Park System in the North by taking the identified areas to the park reserve stage as a cornerstone for the 1985 National Parks Centennial. Council noted that economics is not the prime objective in establishing national parks, although it is a legitimate and positive factor. The direct and indirect contribution to the tourism industry is substantial, and while the total figures are small compared with southern Canada, they are significant to the small northern communities.

National Marine Parks Policy

Council reviewed the proposed National Marine Parks Policy, which would apply to new marine parks and to the marine component of existing national parks. Members supported the general thrust of the policy. In their view, the policy was an effective instrument, and adoption and implementation

of the policy would be a significant step toward protecting representative marine areas as a heritage legacy.

Council's main concerns related both to the problems of multiple use, e.g., providing for the continuation of commercial fishing, and to the need for a complementary plan for implementing the policy. Council urged that an action plan be prepared with specific deadlines for establishing national marine parks. It also noted the need for innovative, cooperative, participatory approaches to working with other levels of government and with the residents of areas that would be affected by the establishment of marine parks.

Proposed Saguenay National Marine Park

The attention of Council was drawn to the dramatic decline of the St. Lawrence beluga population. Over the years, the population had dropped from an estimated 3,000-5,000 to between 300 and 500. The Committee on the Status of Endangered Wildlife in Canada officially declared this beluga population endangered in 1983.

Council visited the Saguenay Fiord area in conjunction with the meeting at Chicoutimi, and members were briefed on the problems of the beluga population and the potential of the area for establishing a national marine park. The current problems contributing to the decline of the beluga population were identified as habitat alteration through a variety of industrial activities and harassment of the belugas by vandals and well-intentioned whale-watchers. Council also noted that toxic chemicals in the water of the St. Lawrence River may be affecting reproduction, but the evidence was not yet conclusive.

Council urged that immediate action be taken in two forms: effective enforcement of the Regulations for Protection of Belugas and steps to protect the habitat through establishment of a National Wildlife Area or National Marine Park Reserve. The long-term goal, in Council's view, should be to establish a National Marine Park on the St. Lawrence at the mouth of the Saguenay Fiord. Council noted that there is support for a national park proposal among local residents and urged that negotiations on establishing a park be started with the Government of Québec.

Public Consultation

Council continued to provide advisory support both to the Minister and Environment Canada in connection with the National Public Consultation Meeting, and to the National Steering Committee of the Environmental Non-government Organizations (ENGOs). On invitation, CEAC representatives attended ENGO meetings and participated in the National Public Consultation Meeting. Council was also invited to contribute an article on the future of citizen participation in environmental issues to the departmental magazine "Update". The article, "The Key to the Future", prepared by Council member Mrs. Louise Beaubien-Lepage, appears in this report as Annex G.

On an emergency basis, Council also helped with funding the 1983 ENGO National Meeting. Subsequently, Council urged the Minister to make adequate funding available for all aspects of the Department's Public Consultation Policy, and to encourage a greater regional focus for the program. Late in the year, at the request of the Minister, Council agreed to review problems in the operation of the Public Consultation Policy, particularly in relation to ENGOs.

Sustainability of Agricultural Soils

The continued productivity of Canada's agricultural soil has been of concern to the members of Council for some time. It is regarded as one of Canada's priority environmental issues, and concern has also been expressed by individual provincial councils and at assemblies of environmental councils. Council took initial action in 1982-83 by commissioning preparation of an overview of current thinking by soil scientists.

Council also commissioned a comprehensive study to be carried out during 1983-84. Completion of the study, undertaken by Dr. R.A. Hedlin and Dr. D. Kraft of the University of Manitoba, was re-scheduled for the 1984-85 fiscal year. The objective of this study is to prepare, in layman's language, an integrated digest of past developments, current trends, and future policy options regarding agricultural land use and soil degradation problems. In particular, the study is to establish probable future trends on the basis of historical data and evaluate their economic consequences.

Lead in Gasoline

Late in 1982-83, the Minister announced the intention to move toward a reduction or elimination of the lead content in gasoline and asked Council for its advice on alternative ways of dealing with the issue. Members reviewed available documentation, and examined alternatives from a public perspective.

On the basis of available data on the real or potential hazard to human health and to the environment, Council was convinced that there was ample justification for a policy of reducing and eventually eliminating lead from gasoline, and that debate about the precise magnitude of effects should not be allowed to delay action. Council urged that a much more extensive program of public information be carried out to clarify misunderstandings about the compatibility of older cars and unleaded gasoline, and to inform the public regarding the hazards from lead emissions. While regulatory action would be required, particularly to discourage continued manufacture of cars which use leaded gasoline, Council urged that a priority be placed on economic incentives — a different rate of federal tax on refined petroleum products that would eliminate or reverse the current difference in price at the service station between leaded and unleaded gasoline.

Enforcement Policy

Council followed up on the previous year's discussions with the Law Reform Commission by carrying out a preliminary review of Environment Canada's enforcement policies and practices. A number of questions were raised with the Minister including the adequacy of the Department's legislative mandate, the level and consistency of the Department's enforcement efforts, and the need to assist and support private prosecutions. While Council focused particularly on "enforcement" aspects, it was suggested that a broad review of the Department's compliance strategies is needed to assess the relative merits of alternative means of ensuring compliance with environmental standards. Such means would include negotiation, contractual arrangements and mediation.

Environmental Awards and Symbols

The Minister referred to Council for review and advice a proposal developed by the Department for a program of awards and symbols. It was proposed that Council would play a major role in managing the program. Council expressed strong reservations on the proposal. They noted, for example, the inability of Council (because of its limited resources and semivoluntary, part-time nature) to perform any function in an awards program other than that of providing advice. Members expressed mixed views on the proposal for an "environmentally friendly" symbol for consumer products. In particular, they questioned the resources that would be required to operate the program. Council was more supportive of the proposed awards for outstanding environmental performance by business and industry, but urged that the awards be organized on a regional basis to maximize their impact. Regarding awards to individuals and organizations, Council favoured providing support to existing award programs rather than introducing what could prove to be a competitive program.

Federal Funding of Forest Access Roads

Council was prompted to examine this question by a letter of complaint from a naturalists' organization that criticized the Department for supporting unsound forest management practices through federal-provincial forestry agreements. These agreements included provision for funding forest access roads. It was Council's view that agreements should ensure that any federal funds are spent in an environmentally-sound manner, and that all federal-provincial forestry agreements should emphasize regeneration, protection, research and silviculture rather than access roads designed for harvesting. Council also supported including requirements in agreements that would ensure long-term resource planning, professional forest management, and environmental protection.

Northern Priorities

At the Minister's request, Council agreed to develop a proposal on how a strategy could best be developed on "a sustainable northern economy from an environmental perspective". The proposed strategy would include consideration of environmental and economic priorities in the North, and policy options that should be explored in relation to hydrocarbon development projects.

By year-end Council had discussed the proposal with a number of interested parties, was reviewing available relevant documents, and was considering the possibility of a workshop sponsored by an independent organization that might bring some new thinking to the subject.

Role of Council

Although Council had adopted a revised statement of its role in 1981, this subject was further discussed in 1983-84. Discussion was prompted in particular through discussions at the Assembly of Environment Councils of Canada, and through questions and proposals raised by some of the new members of Council. Debate focused on the priorities that should be given to Council's role as a confidential adviser to the Minister vis-à-vis its public role, and on the emphasis which should be placed on long-term or emerging environmental issues visà-vis current or immediate concerns.

Recognizing that different perceptions of Council's role exist among the public, federal officials, and (to a more limited extent) even among members, Council prepared a detailed statement of its "terms of reference". The statement did not mark a major change in the role of Council or its manner of operation. It was essentially a detailed description, based on the original objectives, of the practice that had been established through the years under the direction of several ministers. A particular effort was made to clearly state the ways in which Council had served, and could serve the Minister of the Environment.

The Terms of Reference were developed through discussions among members of Council and between Council and the Minister. The final draft of the statement was forwarded late in the fiscal year to the Minister, who subsequently approved it. The statement appears in this report as Annex H.

Other

Biotechnology

Council continued a watching brief on biotechnology during the year, including briefings on action taken by the Department since CEAC's recommendations in 1982-83. Council still felt that the Department was not giving adequate priority to two important aspects of biotechnology: economic opportunities (forestry, reduced pollution, etc.) and possible adverse environmental effects. In Council's view, Canada conceivably

has more to gain from biotechnology than from other more publicized areas of high technology.

Wildlife Export and Import Act

Council received briefings on the draft legislation and reviewed the legislation and the rationale behind it. Council agreed with the need for legislative action and offered to provide support when and if required.

Lancaster Sound

The Minister referred the question of drilling in Lancaster Sound to Council for comment and advice. Council suggested that a firm decision should be made so that area residents and industry would no longer be in a state of limbo in relation to hydrocarbon projects in the area. Council recognized the potential of non-renewable resources and pointed out the established productivity of the area's renewable resources. It was further noted that precedents existed for withdrawing exploration rights. Members proposed alternative courses of action, but the preferred option was a deferral of drilling for a specified period of time, e.g., 20 years, to allow time both to deal with anticipated social and environmental problems, and to take advantage of technological advances.

Youth and the Environment

Discussions were held with the Minister regarding ways to encourage greater involvement by youth in environmental quality matters. Council supported the concept of a national poll on youth expectations in relation to the environment, and agreed to obtain information on relevant youth programs.

Role of the Canadian Wildlife Service, and the Federal Wildlife Policy

Council was briefed on the process underway to review the role of the Canadian Wildlife Service and to develop a Federal Wildlife Policy. Council reviewed the documents and established a working group to study the proposals in more detail when work on the process was further advanced. Council expressed concern about an indication that emphasis on research was decreasing. It noted that a number of other functions and operations, including National Parks and environmental protection, rely on CWS research.

Inquiry on Federal Water Policy

Council critiqued a copy of the draft document "Towards a Federal Freshwater Strategy", which was to be distributed by the Inquiry for reference and as a basis for discussion. It also reviewed and discussed the final document, and noted the relationship of the Inquiry to other water-related initiatives, including the development of drinking water quality guidelines. Council made tentative plans for a later meeting with the Inquiry.

Humane Trapping

A review of the issues related to humane trapping was carried out by Council. Members felt that emphasis should be placed on the development of humane traps and trapping methods, but noted that they would have to be practical and meet the needs of trappers, particularly those in remote areas of the country.

Science Policy

Members of Council again expressed concern about what appeared to be the erosion of Environment Canada's knowledge base. Discussion centered on three aspects of science policy: identification of priorities, the assignment of adequate resources, and the role of the Department as a generator of new environmental knowledge vis-à-vis research to support specific policies and programs. Further work on this subject was scheduled for 1984-85.

Environmental Bill of Rights

This subject was discussed with the Minister on two occasions. Members supported some aspects of an "environmental bill of rights", but saw it as only part of a package. Other elements of this package would be an adequate knowledge base, sound policies, and effective enforcement. At the end of the year, Council was reviewing background material and was waiting for new members to be appointed (including one from the legal profession) to provide Council with the necessary expertise for further work on this subject.

History, Status, and Future of Wildlife in Canada

Council endeavoured to interest others in sponsoring or undertaking a project to prepare a book documenting some of the early efforts in managing wildlife in Canada. Although Council did not see such a project as part of its formal function, it noted the dwindling number of pioneers in wildlife research and management. Accordingly, it was suggested that their recollections should be recorded while this was still possible.

Alternatives to Existing Methods of Regulating and Enforcing Environmental Standards

One of the recommendations adopted at the Assembly of Environment Councils asked that CEAC review alternatives such as using contracts, economic rewards, and penalties (rather than the criminal law) as the basis of enforcing environmental standards. Although Council recognized the need for the study, it did not have either the resources or legal expertise to carry out the study in 1983-84. The resolution was drawn to the attention of the Minister in the hopes that the Department could prepare the review.

Public Input to the Process of Establishing and Reviewing Environmental Standards

The Assembly of Environment Councils also recommended that each Council review ways and means of providing for public input in relation to environmental standards. The recommendation stemmed from the recognition that the process should not be a strictly technical matter because of the significant value judgements involved. Council recognized that Environment Canada had made major efforts in this direction through the Public Consultation Policy and other mechanisms, but suggested to the Minister that even more effort be made to obtain public input.

Presentations and Briefings

Briefings were arranged on a number of other subjects as a means of keeping Council members informed on current concerns and issues. Subjects covered in briefings included: Canada-USA relations and the activities of the International Joint Commission, proposed changes to the Environmental Assessment and Review Process, the Strategic Plan of the Québec Region, the program of the Environmental Protection Service, and the work of the Northern Conservation Task Force.

FUTURE PLANS

An effort is made to maintain a balance in the Council's activities between reviews and provision of advice on immediate environmental concerns, and studies of long-term or emerging issues. Although Council initiates some of its activities itself, the first priority in Council's program is responding to requests for advice from the Minister. It is therefore difficult to project a firm schedule of Council's activities several months in advance, much less a full year. On the basis of work underway at year-end and according to other indications, it appears that Council's 1984-85 program will include the following items.

Environment-Economy Relationships

Council expects to continue exploring the complex set of interactions between the environment and the economy, building on the work done to date, including the submission to the Macdonald Commission. In particular, Council is anxious to review the results of studies that have a direct or indirect bearing on the subject.

Environmental Non-government Organizations (ENGOs)

CEAC had organized the first national meetings of ENGOs as a means of improving communication and working relationships between the environmental groups and Environment Canada. In recent years the ENGOs have organized their own meetings, and a good working relationship has developed with the Department. However, the Council has felt that some weaknesses exist in that relationship and is planning a review to identify areas for improvement.

Water Management and Water Quality

Council recognized that water-related issues would be emerging as a major environmental concern of the 1980s. Plans were made for two specific activities in 1984-85, including a review of work underway on drinking water quality guidelines and possible discussions with members of the Inquiry on Federal Water Policy.

Sustainability of Agricultural Soils

The second of two studies that Council commissioned on problems related to land use and soil degradation was originally scheduled for completion in 1983-84, but had to be carried forward into the next year. Council expects that this study will mark the end of work, at least for a time, on this fundamental environmental issue.

Science Policy

Members of Council continued to be concerned about erosion of the environmental science capability in Canada, including that within Environment Canada. Tentative plans were made for another review of the Department's science policy as a follow-up to earlier work done by Council.

Other

Publication of some Council reports has been delayed during the past two years because of the Council's limited resources. A major effort will be made in 1984-85 to bring the Council's publications program up-to-date.

ASSEMBLY OF ENVIRONMENT COUNCILS OF CANADA

Assemblies of the federal and provincial councils have been held annually for several years. The meetings have provided an opportunity for members of the individual councils to exchange ideas, share common problems, learn from the experience of others, and build support for shared ideas and concepts.

The Canadian Environmental Advisory Council hosted the 1983 Assembly, held in Ottawa-Hull. Three CEAC officers (Mr. Tom Beck, Chairman; and Vice-chairmen Dr. Robert Bergeron and Dr. P.F.M. McLoughlin) chaired the sessions. There were three main topics on the program: "The Public Role in Setting and Enforcing Environmental Standards", a report prepared for and presented by the Environment Council of Alberta; "The Role of Councils", a workshop organized by CEAC, which included presentations by four guest speakers; and reports by individual councils on activities in the past year. All provinces and territories were represented, with the exception of the Yukon, British Columbia, Newfoundland, and Prince Edward Island. Generally, the assembly was considered one of the most successful held to date.

Hosting the Assembly represented a major workload for Council, particularly for the Secretariat. The 32 delegates who attended were provided with background program material, summaries of information on all councils, discussion guides for the working groups, simultaneous translation facilities, etc.

A separate, complete report is being prepared on the Assembly. The following is a brief summary of the two main subjects discussed at the Assembly. A copy of the recommendations for action by individual councils has been included in this review as Annex I. No recommendation on the role of councils was adopted because of the varying circumstances of each but a summary of the workshop has been included in this review as Annex J.

The Public Role in Setting and Enforcing Environmental Standards

Mr. Alistair Crerar, Chairman of the Environment Council of Alberta, introduced this subject. The presentation was based on a report prepared for the Alberta Council — "Environmental Standards: A Comparative Study of Canadian Standards, Standard Setting Processes and Enforcement".

Preparation of the report was prompted by discussions at the 1981 Assembly regarding the need for a review of procedures for setting environmental standards throughout Canada. Because of the magnitude of the task, only four provinces were studied — Alberta, British Columbia, Saskatchewan, and Ontario. Canadian federal standards were also compared with standards set in the United States by the Environmental Protection Agency.

The report was reviewed briefly for participants at the Assembly by Mr. Alistair Lucas of Calgary, the principal

author. A discussion followed. One of the aspects on which discussion focused was the need to review alternatives to existing methods, i.e., methods based on the criminal law, of enforcing environmental standards. Contract law and economic penalties and rewards were suggested as alternatives which should be considered. A review of alternatives to the present regulatory approach was suggested, partly because of the difficulties being experienced in obtaining convictions when "reasonable diligence" is claimed as a defence.

The second focal point for discussion was the need for more extensive public involvement in standard setting, because the standards involve value judgements as well as technical considerations. While there were some differences in view regarding applicability to ambient vis-à-vis emission standards, there was endorsement of the public right to make a contribution in the setting of environmental standards.

Recommendations regarding the above two aspects appear in Annex I.

Role of Environment Councils

This subject was the main theme of the Assembly, with four of the five main addresses presented devoted to this subject. After hearing these addresses, the delegates divided into working groups to explore specific aspects of the subject and then returned for a final plenary discussion.

The objective of the workshop was not to define a standard role for all councils, but to weigh a range of possibilities. It was recognized that the role of each council would have to reflect the requirements of its jurisdiction and the circumstances of the time.

A three-pronged approach was used in examining the role of councils: the role in relation to the public, the relationship of councils to government departments, and the role in relation to ministers of the environment. These themes were followed in four of the main addresses presented at the Assembly. The speakers were: the Hon. John Roberts, federal Minister of the Environment; Mr. Jacques Gérin, Deputy Minister of Environment Canada; Dr. David Brooks, Marbek Resource Consultants Ltd.; and Dr. A.C. Maniar, Chairman, Manitoba Environment Council.

One aspect that received particular attention in the working groups was the role of environment councils in relation to ministers of environment. It was noted that environmental issues are now in the mainstream of Canadian politics and that under these circumstances councils should re-think their roles. In particular, they should consider how they can strengthen their minister's position in Cabinet.

As noted earlier, a summary of the findings of the Workshop appears in this Review as Annex J.

MEMBERSHIP

Canadian Environmental Advisory Council

March 31, 1984

Mr. Thomas Beck Calgary, Alberta Chairman

Dr. Peter F.M. McLoughlin Peter McLoughlin Associates Ltd. Comox, British Columbia Vice-Chairman

Ms. Susan Holtz Ecology Action Centre Halifax, Nova Scotia

Mr. Monte Hummel World Wildlife Fund (Canada) Toronto, Ontario

Mr. Trevor G. Jeanes Balco Industries Ltd. Kamloops, British Columbia Madame Louise B. Lepage Fédération des associations pour la protection de l'environnement des lacs Montréal, Québec

Mr. B.A. Hubert Boreal Ecology Services Ltd. Yellowknife North West Territories

Dr. D. MacKay University of Toronto Toronto, Ontario

Dr. T. Hancock Department of Public Health Toronto, Ontario

Secretariat

Mr. Max McConnell, Executive Secretary

Dr. E. Fred Roots, Science Advisor

Mrs. Veena Halliwell, Administrative Assistant

Environment Canada Ottawa, Ontario K1A 0H3

LIST OF PUBLICATIONS

Annual Review 1973-1974. Part A — Activities 1973-1974 by Arthur Porter. Part B — Problems and Priorities in the Canadian Environment by Pierre Dansereau.

Annual Review 1975. Part A — Activities 1975 by Ian McTaggart-Cowan. Part B — Significant Canadian Environmental Problems by J.P. Nowlan.

Annual Review 1976. Part A — Activities 1976. Part B — The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A — Activities 1977-1978. Part B — The State of the Canadian Environment.

Annual Review 1979-1980. Activities 1979-1980. A Decade of Environmental Concern: Retrospect and Prospect by Donald A. Chant. Environmental Assessment and Review Process: Observations and Recommendations.

An Environmental Impact Assessment Process for Canada. Council Report No. 1, February 1974.

An Environmental Ethic — Its Formulation and Implications. Council Report No. 2, January 1975. By Norman H. Morse.

Harmony and Disorder in the Canadian Environment. Occasional Paper No. 1. By Pierre Dansereau. Council Report No. 3, 1975.

Environmental Aspects of Nuclear Power Development in Canada. Occasional Paper No. 2. By H.E. Duckworth, H.W. Duckworth, Arthur Porter and J.S. Rogers. Council Report No. 4, 1977.

Towards an Environmental Ethic, March 1977. By D.A. Chant.

Report of the Second Joint Meeting of Environmental Advisory Councils. May 1977, Fort San, Saskatchewan. Council Report No. 5, March 1978. Produced in collaboration with the Saskatchewan Environmental Advisory Council.

The Management of Estuarine Resources in Canada. Council Report No. 6, March 1978. By Irving K. Fox and J.P. Nowlan.

Reports of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council. Council Report No. 7, May 1978.

Ecotoxicity: Responsibilities and Opportunities. Council Report No. 8, August 1979. By Ross H. Hall and Donald A. Chant.

Report of a Meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Council Report No. 9, April 1981.

A New Approach to Pest Control in Canada. Council Report No. 10, July 1981. By Ross H. Hall.

Wildlife Conservation Issues in Northern Canada. Council Report No. 11, October 1981. By Ian McTaggart-Cowan.

A SUBMISSION TO

THE ROYAL COMMISSION ON THE ECONOMIC UNION AND DEVELOPMENT PROSPECTS FOR CANADA

From

The Canadian Environmental Advisory Council

December, 1983

Summary

In Canada, the long-term health of the economy and the environment are essentially the same — harm one and you harm the other. The subject of environment-economy relations thus raises a number of issues of fundamental concern to the Royal Commission. Such issues include:

- What are our obligations to future generations of Canadians?
- What are the ends to which our economic activities are directed? What are our values, and what should they be?
- What are the ecological realities to which the economy must conform?
- How much is enough? What are the demands we can realistically place upon our environment in the light of ecological realities and our obligations to future generations?
- What re-structuring of our decision-making system is needed if we wish to sustain the resource base which supports our economy?

In exploring these issues, which involve the interrelationships of ethics, political strategy and long-term economic policy, we have provided our views with respect to economic policy from an environmental perspective. We have not, at this stage, proposed solutions other than in general terms. We will be prepared, on the basis of studies now underway, to provide more specific recommendations in connection with the discussions planned by the Commission in 1984.

Introduction

The Canadian Environmental Advisory Council (CEAC) is an advisory body to the Federal Minister of the Environment, providing advice on environmental issues and problems, and bringing to the attention of the Minister issues which Council perceives to be of public concern. The Council is an independent body of appointed Canadian citizens. Council develops perspectives on a broad range of regional, national and international environmental issues.

In this preliminary brief, we seek to provide a long range, dynamic and holistic perspective on the economy and on the direction we believe is necessary if we are to maintain a healthy environment. We have sought to identify longer-term problems and issues, as requested by the Commission, in the expectation that once the Commission has developed its issues paper we could respond with more details on these matters. In so doing, we will draw upon our ongoing efforts to further define and understand environment-economy relationships.

It is our view that a direct linkage exists between the longterm health of both the economy and the environment. In Canada they are essentially one. We have an economy that is primarily resource-based and thus environment-based. Impair the environment and you impair the economy.

We believe, very strongly, that the economy must be the servant, and not the master, of our values. We do not exist as people or as a nation simply in order to have an economy. Our economy and our economic development should be among the means to an end, and not ends in themselves.

Our economy must conform to ecological reality. It cannot be based on exploitation of the earth's resources at rates which exceed the capacity of the ecosystem to accommodate the impacts of exploitation. The availability of resources and their sustainability place outer bounds on our economic pursuits.

The ways in which we shape and develop our economy are influenced by the constraints and capabilities of not only local, but of regional and global life support systems. This has become increasingly apparent with the growth in international trade and with the appearance of adverse environmental impacts, such as acid rain, on a global scale. Obviously Canada's economic future must be examined within a global framework, and we suggest, also on a long-term basis.

We believe that the economic activities undertaken must be sustainable in the long term. Our present standard of living is based to a great extent on our natural resources. If they deteriorate so will our real standard of living. Only we can ensure that our descendents will have an opportunity to enjoy the same quality of life as we wish for ourselves.

The above considerations do not add up to a negative approach. There are constraints, but there are also opportunities. The body of scientific knowledge which can be applied to improve the complex of resources on which our economic health depends is expanding exponentially and is creating new areas of possibility. To take advantage of them, however, will require fiscal, monetary and institutional policies and incentives radically different from those which are currently in vogue.

We are also encumbered with a set of values and assumptions which are responsible directly or indirectly for our current environmental and economic difficulties. They need to be re-examined in light of our new knowledge about environment-economy relations. We may need to redefine or rethink our measures of economic activity which currently fail to include "externalized" costs such as pollution of our air, water and soil. We should perhaps revise the concept of Gross National Product as a measure of our success, and think instead of "net human benefit", a measure which attempts to subtract from the total of all goods and services produced by society those activities which generate human or environmental costs. We need to recognize that the earth's resources are finite: non-renewable resources are present only in a certain amount, while renewable resources can only be harvested at a particular level if they are to regenerate on a continuing basis. And we need to rethink the concept of economic growth. Can we realistically expect unending increases in per-capita or even total consumption of the earth's renewable and non-renewable resources, especially in a world where there is already gross inequality in such consumption?

It is with such values and assumptions, some of which are traditional thinking in our society, that this Royal Commission must first be concerned. For it is only when we have agreed upon what it is that we want from our economy that we can then consider the necessary means of adjusting the economy to attain those ends.

The Environment/Natural Resource Base

When the European settlers first came to North America, the supply of resources seemed endless and the environment impervious to damage — there was always more over the hill or down the road. Given that perception, an economic system developed which was based upon the cheap exploitation of seemingly limitless natural resources. While the perception may have been relatively valid historically, it clearly has not been in this century. The result has been damage, in some cases severe damage, to our environment and our natural resource base. We can no longer afford to manage our natural resources with a "frontier" mentality.

It is now well recognized, as our information base has improved, that we have been over-harvesting many of our

resources.* Our agricultural practices have resulted in severe damage to our soils, and there are serious doubts as to the long-term sustainability of the soils on which much of our national and export economies are based. In the forestry sector, failure to regenerate forests at a rate that equals the denudation of timber land is threatening not only the future of the forestry industry and our export economy, but also damaging our watersheds, depleting our wildlife habitat and diminishing our outdoor recreational opportunities. The pollution of our waters, watershed damage, and over-fishing in our marine and fresh waters, have resulted in severe damage to our fisheries. Serious concerns have been raised about the effectiveness of our approach to water management, with respect to both quantity and quality. Our wildlife populations have been severely depleted or damaged in some areas, either through pollution, over-hunting, habitat destruction or as a result of other environmentally inappropriate activities. The rate of extraction of hydrocarbons and other minerals, and the environmental and economic impact of our extraction and processing methods are causes for concern.

Each of these resources has its own positive and negative dynamics, regional dimensions, and institutional characteristics. Generalizing about the cause of problems and about prospects is very difficult. What is common to them all, however, is that the development and application of sound policies and practices has been grossly inadequate. The problems have been complicated by jurisdictional issues between and within the various levels of government; and, to a great extent, the effective resource management decisions have been made by the private sector; the large companies sometimes equipped with bureaucracies and systems as inelastic as those of the public sector. The problems have been compounded, historically, with the need to maximize shortterm profits and to control resources in order to stay alive financially. Furthermore, many of the more important decisions related to the maintenance of financial/economic health and the nature of Canada's resource development have been made extra-nationally or in extra-national interests.

In addition to domestic issues impacting on our resource base, there are global influences. The "greenhouse effect", for example, to which we ourselves contribute, is becoming defined more specifically. Over the coming decades, certainly 40-50 years, it could affect markedly both the quantity and quality of our resource base, the impacts varying between resources and locations. Greater variations in climatological conditions may also be in store. The long-range transportation of air pollutants, already recongized as a serious problem, will have cumulative impacts on the productivity of many of our renewable resources. Because of the deteriorating nature of the resource base in many parts of the world, there is growing international pressure for Canada to make up the deficit. Over time this will contribute to the need for structural reform in the management and utilization of our resources.

^{*} See List of References attached.

An Appropriate National Goal

Given these interrelated circumstances, what must be Canada's goal? Clearly the goal must be the evolution of an economy which is consistent with a healthy environment, an economy which is ecologically sound and which may be enhanced by the application of suitable, evolving technologies and management techniques.

Such an economy would, we believe, have three key characterictics:

- a) it would manage non-renewable resources at a rate that would optimize their long-term benefits;
- b) it would expand the productivity of the renewable resource base;
- it would develop institutional, financial and technological means of increasing the efficiency of resource utilization while maintaining or enhancing the quality of the environment.

Some Preliminary Thoughts on Means

Achieving the above goal will call for a number of major changes in the way we manage the economy and the environment. In this initial brief we have focused on one fundamental change: internalizing present economic externalities, i.e. incorporating in the prices paid for goods and services all of the economic costs involved in producing them. Specifically, we should examine with care the distribution of

economic rent. Regardless of the institutional mechanics of its collection and spending, economic rents from resource extraction should be reinvested to:

- (1) pay for whatever is required to sustain the yield of any given resource;
- (2) pay for whatever is required to enhance and improve the yield of any given resource, recognizing that resource use and resource improvement are mutually inter-acting (improve one and you generally improve others), and that biological and economic optimums are not always identical;
- (3) in conjunction with the above, provide for the repair of historical damage done by resource extraction.

It is apparent that governments have not consistently reinvested economic rent to adequately meet these requirements. More importantly, it appears that the various levels of government have not consistently exercised the political will and the technical and managerial skill to put in train those processes required to achieve the objectives listed above. Now, when the massive cost of resource rehabilitation is finally being recognized, the impact is proving traumatic.

The Canadian people and their governments must find the political will, the technical and managerial skills, and the organizational and institutional structures necessary to create an economy which reflects and complements a healthy environment. That is the challenge facing us today.

REFERENCES

Barney, G.O., Freeman, P.H. and Ulinski, C.A. *Global 2000: Implications for Canada*. Study commissioned by Environment Canada and publication sponsored by the Canadian Association for the Club of Rome.

Canadian Council of Resource and Environment Ministers (CCREM). June 6-7, 1979. Forestry Imperatives for Canada. A Proposal for Forest Policy in Canada. Prepared for the Annual Meeting of CCREM, Kelowna, B.C.

Environment Canada. *Canada Water Year Books: 1975, 1976, 1977-78, 1979-80, 1981-82.* Inland Waters Directorate, Ottawa, Ontario.

Great Lakes Water Quality Board. 1981. Report on Great Lakes Water Quality.

International Union for Conservation of Nature and Natural Resources (IUCN). 1980. World Conservation Strategy.

McCuaig, J.D., Manning, E.W. January 1982. *Agricultural Land Use Changes in Canada: Processes and Consequences*. Series No. 21. Lands Directorate, Environment Canada.

McTaggart-Cowan, I. October 1981. Wildlife Conservation Issues in Northern Canada. Report No. 11. Canadian Environmental Advisory Council.

Pearse, Peter H. September 1982. *Turning The Tide. A new Policy for Canada's Pacific Fisheries*. The Commission on Pacific Fisheries Policy. Final Report. Department of Fisheries.

A Statement by the Canadian Environmental Advisory Council On

ACCEPTABLE RISK

Prepared by Ms. Susan Holtz,*
October, 1983

Preface

This statement was prepared by a member of Council, Ms. Susan Holtz, following several discussions of the subject at council meetings, and a request from the Minister for Council's views. There is widespread public interest in the subject of "risk", particularly risk assessment and/or risk analysis — the techniques or processes leading toward the definition of levels of risk which the public may be asked to accept. This statement has been prepared as a contribution to public debate on the issue; debate which, in the view of Council, is an essential element in the process of defining the acceptability of risks.

The main thrust of the paper is to highlight some of the limitations of risk analysis. The danger is that risk analysis will be misapplied or used where it is not appropriate. As a technical tool, it has a tendency to oversimplify complex scientific questions. It is also unreliable as a quick and simple means of resolving contentious policy questions because choices about risk involve ethics and value preferences. Risk analysis in its present applications may ignore the fact that ultimately the acceptability of any risk is a social/political judgement, and the political process of making decisions about risk cannot be short-circuited.

Introduction

On several occasions during recent years, Council has touched briefly on the subject of "acceptable risk". A statement by Council has been prompted by two circumstances: the current high level of interest in the topic, and, more specifically, a request from the Minister of the Environment for advice from Council on the subject.

This statement is not an in-depth review of the techniques developed or under development. It is, rather, an overview of the place of risk analysis in the whole process of establishing the levels of risk used as the basis of regulation and policy decisions. It may appear to be an unduly critical view, but Council is concerned that the social implications of risk analysis be given consideration at least equal to that accorded its technical aspects.

Risk analysis has been described as a "growth industry". Books are being written, papers presented, and conferences held on the subject. There is obviously a perceived need, particularly by those responsible for regulation, to develop an organized approach to defining and weighing risks, and to find some means of establishing what, if any, levels of risk are acceptable for particular activities in society. In the rush to come to grips with these questions there is a danger that a relatively simplistic, technical approach may be adopted, an approach which does not give proper recognition to the inadequacies in our scientific knowledge, and, even more important, to significant ethical considerations. The latter are an essential, perhaps the essential element in arriving at any decisions about levels of risk. Failure to recognize these concerns will lead to misunderstanding and feelings of alienation between government agencies, industry, and the general public. Disagreement about risk is inevitable, but the process of making decisions about its management can and should be a more constructive one if these considerations are recognized.

Weaknesses of Risk Assessment

It is critically important for both regulators and the public to understand that risk assessment as a technique involves uncertainty at various points in its procedure. Risk assessment cannot be used as an objective, scientific tool to cut through the public's "emotional response" to perceived risk. This has been the promise of some promoters of the technique, but it is based on two false premises: (1) that risk assessment can be scientifically certain and objective; and (2) that the technique can rationally resolve issues which are fundamentally disputes about values or ethics. Both of these incorrect assumptions are discussed in greater detail below.

Scientific Uncertainties

To understand why risk cannot be assessed without scientific dispute, it is necessary to be clear about what risk is. Risk is a technical term: RISK equals HAZARD times PROBABILITY. The hazard is the harm that might occur; for example, cancer, drowning, or soil erosion. The probability is the likelihood, often expressed in numerical terms, of the occurrence of that harm. To illustrate: crossing the Atlantic by ship can be done in an ocean liner or single-handed in a small boat. In both cases, the hazard is the same: drowning.

^{*}Member, Canadian Environmental Advisory Council.

However, the probability is much greater in the small boat, and therefore the probability factor makes the risk greater.

There can be scientific uncertainty about both the hazard and the probability. For example, it may be uncertain whether a substance causes cancer at all. In that case, the hazard is not understood. In another instance, it may be agreed that the substance is a carcinogen, but the dose-response rate is under dispute. The probability of harm, therefore, is unclear. Moreover, the uncertainty may be complicated by such factors as there being different responses or response rates in different populations and age groups, or different exposure pathways; or there may be synergistic effects which are not well understood.

The above can be illustrated with a much-studied example: a major accident in a nuclear power reactor. In this case, there are significant uncertainties about all of the following factors which are related to probability: likelihood of a particular part or system failure; failure sequences; the occurence of various meteorological conditions; and the specific pathways of exposure of the local population to released radio-active materials through food, water and air. Uncertainties about the hazard relate to unresolved questions about the health effects of low levels and various types of ionizing radiation, especially with reference to different age groups and in conjunction with other factors, such as smoking. Uncertainties about the amount and type of radioactive materials released, and the exposure of workers during a clean-up operation, relate to hazard and probability.

Each of the above points of uncertainty involves making assumptions or calculations, and some of these could differ from equally defensible statements by several orders of magnitude. There are similar complexities in assessing risk in any real-world situation. As a result, the summary of a risk assessment in terms such as "the probability of harm to an individual from (x) is the same as smoking two cigarettes a day," although sounding authoritative, in fact has an extremely shaky base of data and assumptions.

Moreover, this use of risk assessment tends to obscure rather than illuminate the underlying scientific controversies which may be involved. Who could tell, from a risk assessment of nuclear reactor accidents, that the effects of certain types of radiation exposure on different age groups is a matter of ongoing scientific debate and investigation? And yet, new research in this area could have great importance for a risk analysis of this energy source. Only those already knowledgeable about the issue are in a position to challenge the assumptions contained in the calculation, and then only if the assessment is unusually explicit in stating its assumptions. This makes a critique of the conclusions of an "objective" assessment of risk an activity for only a very technically wellinformed few. Risk assessment, thus, at best, can decrease the accessibility of debate, and, at worst, can be manipulatively used to justify almost any conclusion the practioner wants.

This weakness is, of course, true of any technical tool, including computer models, statistical analyses, and so forth. We do not on that account avoid sophisticated techniques in environmental matters, nor should risk assessment be dismissed either. For one thing, its use is not new in fields such as engineering, where it is recognized as a useful tool for comparing the safety of different design approaches.

However, risk assessment must be used appropriately. What "appropriate" means brings up a discussion of the technique's other great inability: its powerlessness to resolve disputes concerning values.

Ethical Problems

Practitioners of risk assessment sometimes attempt to reduce risks to a common denominator — e.g., person-days of work lost — in order to compare risks. This approach makes the assumption that everyone is an "average" individual with equal susceptibility to the risk, and with equal benefits derived from the activity in question. Of course, this is not an accurate representation. Because of the inaccuracy of the assumption about "average" costs and benefits, it is also an ethically indefensible position. When risks are compared for a society, it is essential that they be similar risks — in the distribution of possible harms and benefits among people affected, including future generations, and similar also in qualitative dimensions including voluntariness, irreversibility, and potential for catastrophe.

Generally, and perhaps disappointingly, the proper use of risk analysis appears to be quite limited. What can be attempted is a risk assessment which identifies the particularities of alternative courses of action. The costs and benefits to any specific groups must be clearly identified, along with any special qualities of the risks involved. After that, an ethical assessment should be done as part of the analysis.

One of the most difficult ethical questions raised is, essentially, the right of society to allow or inflict possible harm on individuals and groups who have not been consulted, or who have not been provided with sufficient information on which to base an intelligent decision, or who consciously prefer a different course of action.

In other fields, for example the criminal justice system, our society goes to great trouble and expense to avoid harming the innocent. Although this protection of the innocent individual is sometimes at the expense of failing to protect society from the criminal, it is accepted because in our political tradition we place a strong emphasis on individual rights. Indeed, the concept of a bill of rights lays stress on the absolute nature of certain rights regardless of any decision of the majority to abridge them.

On the other hand, the rights of individuals are considered to have some limitations due to concerns for the overall good of society. One example is the right of the state to expropriate property; another relates to the suspension of normal individual rights under emergency conditions. The point here is that the issue is not simple, either in theory or in practice.

However, the most important ethical point that must be recognized is that people will weigh risks and benefits differently, sometimes dramatically so, depending on their individual value systems. Individuals, even geographic neighbours, will not necessarily react in the same way to a proposed development which has a direct and immediate impact on them. In a broader context, those same neighbours may make different assessments of the overall risks and benefits to society as a whole from a policy or project which will have no direct effect on their own lives. It should be expected that some people, both personally and as an opinion about policy options, will prefer the costs and benefits of burning wood, for instance, to the costs and benefits of electric heat from nuclear reactors — and that others will assess the trade-offs very differently. There is no reason at all why everyone should think the same way about these options.

Hence, the term "acceptable risk" is very misleading. One must always specify acceptable to whom, and that implies a conscious decision with all the relevant information available.

Nor does actual behavior necessarily reflect the optimum course of action that could be chosen for society. In the case of a consumer buying a car, the mere fact of purchase does not necessarily imply that the product, in the buyer's mind, is safe enough, just that the trade-off is the best available.

As a bottom line, then, there is no short-cut through the usual political process of laboriously assessing options. All judgements about risk are based on values as well as on facts. It follows that it is incorrect to think that if only people were more rational, technical risk analysis could provide us with quick and easy decisions about the right course of action on such contentious issues as chemical spraying or nuclear energy.

Conclusion

The value of a broad risk assessment as a means of developing or justifying policy is questionable. This is particularly true of attempts to compare the risks of different types of activities, such as the familiar, immediate, and voluntary hazards of skiing or auto travel, with those posed by uranium tailings or pesticide spraying. The inscrutability of such calculations tends to make people feel — correctly — that their opinions are being manipulated. As well, for reasons explored above, significant ethical considerations are ignored in such comparisons.

On the other hand, public debate is of better quality if those taking part are aware of, and have sorted out for themselves, the acceptability of various kinds of risks. It is sometimes a fair criticism that people concerned with particular hazards have a limited perspective on risks generally. This criticism can apply to risk managers and regulators as well

And just because the discussion concerns values doesn't imply that no meaningful exchange can take place. New information can cause individual and public perceptions to shift. Values themselves can be challenged in a rational dialogue by reference to their contradiction of other fundamental concerns such as consistency, fairness, or economic benefits for oneself and others.

It is our belief that better public understanding of risk, risk assessment and analysis, and the management of hazards is needed. This should be generated through a process of self-education and non-threatening discussion involving the general public, and especially those most concerned with environmental hazards. The most obvious groups whose input and understanding are particularly required include environmental activists, government officials, industry representatives, and legislators; and strong efforts should be made to encourage their involvement in debate about the assessment of risk in society. This process of discussion and learning may have to be a continuing one, but it is critical that an initial level of understanding be reached before any firm policy is established on acceptable levels of risk, and on the use of risk analysis to establish those levels.

A Statement by the Canadian Environmental Advisory Council On

ASSESSING PROPOSALS FOR A CANADIAN PESTICIDES ADVISORY BOARD

Prepared by: Ms. Susan Holtz**

March, 1984

INTRODUCTION

The Canadian Environmental Advisory Council was requested by the Minister of the Environment in November 1983, to comment on the establishment of an advisory board on pesticides*. While this discussion paper was being prepared, the Minister of Agriculture announced that his department would be looking at a consultation process for pesticide registration. This paper was completed as a contribution to discussion about the role and usefulness of any such advisory or consultative body.

Several recent events have contributed to the current interest. in making changes to the pesticides registration process. At the meeting of Forestry Ministers under the Canadian Council of Resource and Environment Ministers in the fall of 1983. New Brunswick brought forward a proposal for an advisory body. This proposal was based on its own experience and that of other provinces and the United Kingdom. Another significant event was the Nova Scotia herbicide court case. The outcome of that case made it clear that one of the very few avenues for input from private citizens on the use of agricultural and forestry chemicals, namely the courts, was perilous in the extreme for anyone with limited financial means. At the same time, the extraordinary support the Nova Scotia plaintiffs received demonstrated that many of the public are not convinced that legally registered pesticides are safe enough. Since Canada's regulatory decisions generally follow U.S. decisions, events like the scandal following the Industrial BioTest Laboratories' falsification of test data and the recent irregularities in the U.S. Environmental Protection Agency's decision- making procedures (closed-door meetings between industry and staff on chemicals under review) indicate that the public has good reason to be concerned. It is not surprising, therefore, that many people, including federal and provincial cabinet ministers, government officials and environmental groups, have stated that there should be some serious exploration of alternatives to the present system of pesticide registration.

POSITIONS TAKEN BY THE CANADIAN ENVIRONMENTAL ADVISORY COUNCIL IN THE PAST

The Council is a group of individuals from different backgrounds and with a wide range of expertise who are appointed to advise the federal Minister of the Environment. Since at least the mid-1970's, the Council has spoken out about the pervasive hazard posed by toxic chemicals in the environment. Two of Council's reports have been devoted to this topic: Ecotoxicity: Responsibilities and Opportunities by Drs. Donald Chant and Ross Hume Hall, which addressed the broad issue of how the environment is being affected by chemical poisons; and, more recently, a report by Dr. Hall on one category of these toxic substances, pesticides. In that latter report, entitled A New Approach to Pest Control in Canada and published in 1981, Dr. Hall examined the difficulties of comprehensively testing the safety of all the pesticides registered in Canada, and concluded that, because of the numbers of inadequately tested chemicals that are now in use, a serious review of their safety would not only be prohibitively expensive but also physically impossible in view of the limited number of laboratories and technicians that are available in this country. Instead, he proposed that the only workable approach to controlling the use of potentially dangerous pesticides lies in developing an agency which reviews and mandates the safest pest control strategies possible. These would primarily include specific biological pest controls and integrated pest management. The latter focusses on the application of in-depth knowledge of the pest's life cycle and can include cultivation practices, the encouragement of natural predators, and a limited and precise use of biological and chemical agents.

Besides pointing out the difficulties of testing the more than 600 pesticides in use now, Dr. Hall's report also documented the problem of the diminishing effectiveness of chemical controls on target pest populations. This increasing pest resistance makes reliance on chemicals an ever more expensive and, ultimately, an unsustainable strategy.

^{* &}quot;Pesticides", in this paper, refers to chemicals used to control any species of plant or animal which can pose a threat to human endeavors, primarily forestry and agriculture. These pests include plants which are considered to be "weed" species, and the concept of "pesticide" therefore includes herbicides.

It is Council's belief that unless there are alternatives to chemical pesticides which are effective and reasonably cost-competitive, the economic pressure on primary producers in forestry and agriculture will mean a level of continuing use of chemical pesticides that will overwhelm regulatory efforts to cope with safety. Consequently, Council stresses that the most important step in reducing the amounts of pesticides used must be the preferential development of alternative control strategies, including the development of institutional support for these strategies such as protocols for testing and registering biological agents. Reliance on making regulatory procedures more stringent is only a small part of the answer to the toxic chemicals problem. This is not to say, however, that there is no role for a pesticides advisory board.

BASIC QUESTIONS IN REGULATORY REFORM

With Council's position, stated above, in mind, let us turn to the issue of regulatory reform and look specifically at what a pesticides advisory board might do, and at what it could not do.

There are three basic questions about a pesticides advisory board which should be addressed: first, "What interests have a stake in this proposal, and are they legitimate interests?"; secondly, "Are there drawbacks to this proposal that are not immediately apparent?"; and, finally, "What could a pesticides advisory board do that isn't happening now and should be?". In the remainder of this paper we will address these questions.

The Interests Behind a Pesticides Advisory Board

A large number of interest groups could be identified, but they can be amalgamated into four broad categories: the general public, and in particular voluntary environmental groups; governments, which are expected to regulate and control pesticides; the pesticides industry, embracing manufacturers, distributors and professional applicators; and, finally, the users, ranging from major corporations to home gardeners. The interests and concerns of these groups form a complex and unstable matrix. Depending on the issue, they may be in conflict, in partial agreement, or in total agreement in regard to a pesticides advisory board.

The Public

There is a widely-shared public perception that pesticide safety is not sufficiently scrutinized in the existing registration/review procedures. (The registration process is the responsibility of the Department of Agriculture, with input from the Fisheries Department, Health and Welfare, and the Department of Environment.) Many past incidents, from the Industrial Biotest Laboratories (IBT) scandal to the recent ethylene dibromide (EDB) scare, tend to back up this belief. Whether or not this is now an accurate assessment of the situation is nearly impossible to determine however, because

the registration of new chemicals is carried out entirely inhouse. Present procedure includes no formal avenue for outside peer review or input from the general public; there are no clear, published criteria for registration or for the initiation of a review of a chemical; and the data on the chemicals themselves and their safety records in actual use are not easily available to the public.

This lack of openness has two important negative effects. First, it deprives the regulators of outside information, experience, and values. Secondly, it contributes to the erosion of confidence in public institutions, especially regulatory agencies. The excluded public feels, not unnaturally, that in the absence of outside scrutiny the regulators' perspectives are all too likely to be unduly influenced by those they regulate. The human tendency for people in constant working contact to mutually influence one another by itself would account for this, even without any other convergence of interest.

Environmental non-government organizations (ENGOs) and people in agreement with these groups' concerns about the safety of chemicals and the value of public involvement in environmental decision-making, may therefore support the proposal for a pesticides advisory board because they see such an institution as a positive step in addressing the issues of pesticide safety, public input, and public confidence.

Governments

Governments, or specific government agencies, are quite likely to be in favour of some sort of pesticides advisory board. This is because — without pointing the finger at any particular government or specific agency — governments as institutions have interests of their own, apart from the representation of their various constituencies' interests, in pesticide regulation. For example, it does not necessarily imply a cynical view of politicians to say that no politician likes a situation which (a) is characterized by scientific disputes and serious differences about values, and (b) requires a choice — for which the politician is accountable — of one of various controversial courses of action, all of which have economic as well as other consequences. These circumstances, which are characteristic of pesticide issues, create the potential for a situation in which a politician may regard an advisory board simply as a means to take some of the pressure off governments by adding another body, visible to the public, to the decision-making process. Acting on the recommendations of such a board would not only leave the government of the day less nakedly responsible, but would also lend expert weight to the decisions made. Thus, for the politician, no matter what he or she feels about pesticide use in general, a pesticides advisory board offers few liabilities and many advantages.

There are many possible models for a new agency. Factors which are particularly important in determining any advisory board's biases and effectiveness are the nature of its membership, its resources and mandate, and its institutional

independence. These elements can be structured, either deliberately or accidentally, to create a body that is credible, independent and constructive, or, on the other hand, one which gives the appearance of independence but whose recommendations are unlikely to rock the establishment boat. The fact that an advisory board can inadvertently be created which falls anywhere on the scale from ineffective to constructive must be recognized at every step of the planning stage, and every effort made to create a body with a genuinely useful role to play.

It must be emphasized that decisions about pesticide use, involving assessments of public and worker safety, of available alternatives, and of accidental harm to ecosystems, are values questions, not merely technical matters. Such decisions properly belong in the domain of public affairs, with governments responsible for the outcome of policy. It is inappropriate for politicians to try to duck such responsibility, although it is perfectly acceptable to honestly seek advice from a wider range of opinion than that provided by bureaucrats. A pesticides advisory board, while it can legitimately open up the decision-making process, must not be allowed to deflect the responsibility from government for developing and carrying out a clear and consistent policy on pesticide decisions — a situation which is far from the case at present.

Industry

The third interest group is the pesticide industry. For the industry, a pesticides advisory board may be a double-edged sword. It could make pesticide registration more difficult and costly, increasing the cost of some pesticides, and could conceivably take or keep off the market a number of products. On the other hand, an independent advisory board might allay some public fears about the use of chemicals, and thus, in the long run, make the use of registered pesticides more acceptable. Even in the short-term, manufacturers of good products should benefit from being able to state that their pesticides had passed the new advisory board's scrutiny.

It should also be recognized that the pesticides industry is reluctant to make the registration process a more open one partly because of legitimate concerns about proprietary information. Since pesticide registration is now quite expensive, it is understandable that a company which takes the financial risks involved does not want anyone else to be able to profit from its data. Such fears, which must be addressed directly in the setting up of a pesticides advisory board, nevertheless cannot be allowed to keep the process as closed as industry has succeeded in making it in the past.

Users

The last category is pesticide users, and this group's interests are undoubtedly the most mixed and even contradictory of all. For some, such as home gardeners, a main concern is that of health and safety; greater openness in the registration process and a more rigorous scrutiny of pesticides would

presumably be welcomed by these consumers. For others, such as pulp companies or utilities using herbicides on power line rights-of-way, the decision to use chemicals is an economic one, and those actually making the decision are not the same people as those exposed to the health risks. For this group, the main concern would be the economic impact of the decisions about pesticides that a new advisory board could influence. This interest is closely allied with that of the pesticide industry, at least so long as pesticides can provide a relatively cheap (or subsidized) solution to their particular pest problems.

For another user group, however, the situation is more ambiguous. In this category are the farmers, small woodlot managers, plant nursery workers and others who believe that their livelihood is tied to their continuing use of pesticides, but who also, along with their families, are most likely to be exposed to the chemicals and to suffer the health consequences that might arise from accidents or high levels of exposure. (This conflict is also experienced by plant workers in the pesticides manufacturing industry, which, however, is not large in Canada.) At the personal level, the response to this situation can range from reluctant resignation to vehement denial of there being any health hazard, and may include, in some cases, a decision to reduce chemical use regardless of economic consequences. Regardless of these varied individual responses, though, it should be clear that the greatest benefits from the development of safer alternatives to chemical pest controls would go to this group of users. A pesticides policy directed preferentially to this end would almost certainly receive broad support from this group, though whether a pesticides advisory board would be seen as important would depend on both the individual's own assessment and the board's mandate and role.

Concerns Not Necessarily Well-Served by a Pesticides Advisory Board

There are other problems which, if not carefully thought through in the setting up of a pesticides advisory board, could be made even more difficult to solve than they are now.

One such concern is the Canadian Environmental Advisory Council's stress on developing alternatives to chemical pesticides, a priority which is shared by most ENGOs as well as by many farmers and foresters who would like to reduce their own exposure to chemicals and the amount of money spent for them. Advice by an advisory board on regulatory changes won't shift the emphasis in pesticide policy toward alternative pest control strategies. In Council's view, the provision of advice on alternative strategies needs to be explicitly incorporated in the mandate of any advisory board, as a component of a policy of sustainable resource use in forestry and agriculture.

Another concern, particularly of scientists and regulators, is that pesticides which pose the greatest risk may not receive the most regulatory attention; or even that some of the resources committed to pesticide regulation could be better allocated to dealing with other toxic substances. The fear here is that a pesticides advisory board would be more likely to respond to public pressure about certain chemicals than to technical assessments of where the worst problems might lie. The worst that could happen would be a serious misallocation of resources which could result in increased, rather than reduced, public risks.

Finally, there are a number of related concerns which can be partially summarized as "Would a pesticides advisory board really make much difference — enough to justify the effort?". This dubiousness about the value of yet another government agency can be felt in many quarters. Pesticide registration is a narrow topic, and bureaucrats may well wonder what a small and resource-limited advisory board could do that the larger corps of full-time scientists and other civil servants can't.

Experienced environmental activists, on the other hand, will also guery whether an additional government body, based in Ottawa, can be of any use in meeting their goals, such as stopping the use of a particular pesticide, or its use under certain local conditions. If the addition of a pesticides advisory board merely changes the arena where pesticide decisions are made without making available an avenue for public input and/or the resources to allow such participation, the new agency will excite cynicism rather than support. For example, public hearings in Ottawa such as those of the National Energy Board are prohibitively expensive for any environmental group in the country outside of southern Ontario and Montreal to attend, let alone to participate in as intervenors. The plaintiffs and their supporters in the Nova Scotia herbicide case, who raised more than a hundred thousand dollars in that local situation, could not have done anything remotely comparable for Ottawa hearings. This is partly because the organizational support — telephones, typewriters, volunteer time, food and lodging — is cheaply available to un-funded citizens in a local situation, and also because these essentials, plus financial aid, are easier to solicit for a situation where the outcome is local and immediate. In all cases, to increase the need for the public's participation without allocating the resources to make it meaningful, is to invite resentment. And this is all the more so if it is not a matter of one special instance, but is instead a regular procedure.

Limiting Expectations

From the above discussion, it is clear that many expectations are likely to be loaded onto a new pesticides advisory board, and that not all of these will be met, not least because some possible functions are in conflict with each other. Let us look at what is impossible or constrained for such a board before turning to the last question of what it might do that is not presently being done.

- Assurance of pesticide safety: Unfortunately, the major public concern about pesticides their safety cannot be comprehensively addressed by a pesticides advisory board. The thorough testing and review of all existing and new pesticides is beyond the capability of the present government departments regulating pesticides, let alone the smaller resources of an advisory board. An honest assurance of the complete safety of all registered pesticides is not achievable by such a body, and should not be held out as one of its objectives.
- A new public forum for local pesticide issues: Although there are many ways an advisory board can increase public input into pesticide decisions, including by representation on the advisory board itself, there are limits to this role. In particular, a federal advisory board is poorly situated to provide an alternative forum (alternative to, for instance, a provincial or local inquiry or hearing) for specific local decisions about which interest and feelings may be very intense, and it is unrealistic to expect a pesticides advisory board to provide this.
- Rationalizing hazard management vs. amplifying **special concerns:** The job of priorizing pesticide issues in order more rationally to allocate regulatory resources involves a very different approach from making heard specific concerns of scientists or others about particular chemicals — drawing attention to new epidemiological data, for instance. One role involves placing chemicals in appropriate contexts; the other making particular pesticides stand out from their context for some reason, whether scientific, ethical, or whatever. An appreciation of both activities is necessary in pesticide regulation, but for an advisory board to try to concentrate on both equally is to risk cancelling out its effectiveness. A division of labour is called for. It should probably be the place of government regulators to develop priorities, and of an advisory board to pick out exceptions, overlooked data, etc. An advisory board whose main function is bringing new facts and outside perspectives to the regulatory process should not at the same time be expected to maintain a public posture of rationalizing and priorizing those same concerns.

Regulatory Gaps Which a Pesticides Advisory Board Could Fill

Not all of the inadequacies of the pesticides regulation process require establishing a pesticides advisory board for their improvement, although in some cases such an agency would be well-placed to fill a present gap. The sole function which a pesticides advisory board could uniquely perform is that of bringing people who are not government officials into the formal regulatory process. The problem areas which an advisory board could effectively address come under two general headings: procedural improvements and policy/data inadequacies. The former involve the lack of access and openness in the regulatory process, while the latter have to do with

insufficient emphasis on, or a lack of clear ways of handling, particular information. These two areas do, of course, overlap, and the following categorization is convenient, not rigorous:

Procedural Improvements

- Departmental conflict of interest: At present, one of the commonest criticisms of Canadian regulatory procedure, and a prime source of public cynicism, is the perceived conflict of interest situation for the Department of Agriculture. That department has final regulatory authority, but their constituency is made up of the sellers and users of pesticides rather than those whose prime concerns are human health and the environment. A pesticides advisory board situated within the Department of the Environment to advise the Minister of the Environment and/or his or her officials, or else structured to advise all federal agencies involved in regulation, would at least add an outside element to the situation.
- Public representation: It is obvious that the composition of the advisory board's membership will determine, in large part, whether this agency is perceived to be, and is in fact, representative of the interests of the public who have hitherto had no formal role in the regulatory process. Putting well-qualified people who have credibility with both ENGOs and the scientific community on the board is one of the cheapest and most effective ways to open up the regulatory process.
- Public hearings: There are circumstances when it would be useful to open the door more widely to input from the various concerned publics, such as on broad policy matters or for a particularly controversial pesticide like 2,4,5-T. At present no agency does this, and a pesticides advisory board could be empowered to hold public hearings on such matters.

Policy/Data Inadequacies

The following are some key areas in which a pesticides advisory board could be the "lead agency", could review the work of other agencies, or could provide the main conduit for input from a broader public:

- Risk policy: At present, there is no articulated policy on pesticide risks which sets out criteria which could be used to discriminate among chemicals, clearly allowing registration in some cases and not in others. Such a policy would not eliminate controversy about pesticide use, but could at least provide a framework for discussion and an increase in regulatory consistency.
- Advocacy of "least-risk" strategies: In energy planning, one aspect of risk assessment which has received much attention involves comparing the risks of all alternative courses of action. However, such comparisons do not appear to have been done in pesticide regulation. At

present, for instance, no agency makes a "least-risk" assessment of pest control alternatives, and no one in the regulatory process is an advocate for integrated pest management and biological controls as safer replacements for particular chemical agents. Nor is there any clear policy which formally weights the significance of the availability of alternatives in considering, or re-considering, a pesticide's registration. As noted for energy planning, the availability of alternatives does appear to be a routine consideration in other regulatory areas; for example, one of the factors which led to the ban on urea-formaldehyde foam insulation was undoubtedly the availability of equally good if not better alternatives. On the other hand, asbestos use is much harder to restrict because there appear to be no good substitutes. Making an assessment of the risks of various means to a desired end seems to be a useful alternative to the rather unrealistic "safe vs not-safe" decision implied in present-day pesticide regulatory practice.

- Initiation of a registration review: No published criteria exist which would mandate the review of a chemical's registration if new information about it comes to light; there is no avenue for the public to initiate such a review; nor is there any way to be sure that new information on registered pesticides is routinely sought and reviewed. A pesticides advisory board could look at policy for all of these areas.
- Random audits: There is not, at present, any way to check on the rigorousness of pesticides evaluation procedures; and while it is true that re-checking data may be costly and largely unnecessary, the IBT scandal is reason enough to call for some method of randomly auditing pesticide registration data used in Canada. Initiating and/or overseeing such random audits could be one function of a pesticides advisory board.
- Pesticide de-registration based on actual use data: An important weakness in pesticide registration is the lack of a formal feedback loop whereby data on the actual use, and mis-use, of the pesticide is collected and evaluated. There should be, although there are not, systematic, ongoing information requirements for monitoring accidents and use under inappropriate conditions, occupational health data from manufacturers and users of pesticides, and damage to non-target species. Such information is not altogether lacking, and may be available to regulators informally. What is absent, however, is a policy of making available, and reviewing, such data in light of established, rigorous criteria for pesticide use restriction and deregistration. A pesticides advisory board could develop or review such criteria.

The reason that action at the level of de-registration or restriction is necessary is that pesticide risks, like other risks, are a product of the hazard multiplied by the likelihood of its occurrence. Unlike rare, catastrophic events such as nuclear reactor meltdowns, the risks from pesticide

use are mainly the result of how widespread the use, and mis-use, of these poisons has become. Mishaps and accidents seem to be very common. Logically, then, regulatory efforts to contain the overall risk presented by the use of pesticides should evaluate what is actually happening with regards to the amount and consequences of accidental exposures and contamination. If the frequency of these events is high, then the risk is correspondingly high, and regulatory action should be forthcoming.

It may be argued that any necessary regulatory action can be taken by provinces or individuals now through the legal system, but some of its inadequacies in relation to misuse were indicated in the judgement on the recent herbicide case in Nova Scotia. In that case, testimony on previously observed mis-use was not considered relevant to the question of current or proposed use. Of particular significance is that evidence of mis-use led to no regulatory change, perhaps because of the absence or inadequacies of policies and criteria. A pesticides advisory board could not serve any para-legal function, but it could establish criteria and recommend policies through which evidence gathered from actual use, including accidents and mis-use, would lead to regulatory change — to additional restrictions and, if necessary, to de-registration.

Conclusion and Summary

To summarize, then, there are pressures which come from a variety of different interests to create a pesticides review board. Some of the expectations about such an advisory board are in conflict or may be unrealistic. In its present state of being a concept rather than a reality, it can be all things to all people, but in actuality it will serve some interests and not others. The determinants of what it is and how it will function are a matter of its composition, i.e., who is on it; its resources; its structural independence, i.e., the size of its staff, the length of appointments, etc.; and its mandate. These things are all political decisions. The question of whether any such board will be a "good thing" or a "bad thing", however, will depend more on the general perspective of those looking at it than on any objective performance criteria, for the

interests of those involved in pesticides issues are in many cases absolutely divergent. Put another way, the creation of a pesticides advisory board would, willy-nilly, serve someone's interest, if only that of government in deflecting public criticism of present procedures. The issue this paper addresses is whether, from Council's point of view, there are any useful roles a pesticides advisory board is needed to fill.

The answer is somewhat equivocal. There are, indeed, in Council's view, weaknesses in current pesticides regulation, both in procedures and in policy content, or lack thereof. A pesticides advisory board could play an important part in improving the situation, although probably other ways to address some of the problem areas could be devised. The one situation where a pesticides advisory board could make a unique and positive contribution is to the present lack of outside review and regular input from the concerned public to the whole registration and review process. This would be an important improvement.

However, there is another side to this. If a pesticides advisory board is set up in the expectation that it will provide a channel for public input, that it will be an amplifier of various public concerns about pesticides, it must have the resources, the personal desire, and the mandate to tackle some of the problem areas in both policy and procedure which are identified in this paper. If it is created in such a way that it is unable or unwilling to carry out this function of opening up the registration process to public input and scrutiny, it would be far better to try to improve present regulatory inadequacies by some other means than to use taxpayers' money to set up a new, high profile government body that can't, or doesn't want to, do the job.

If public expectations of a new regime in pesticide regulation are raised by the establishment of an advisory board, and the high expectations are subsequently dashed by the lack of meaningful results, there would be a further loss of government credibility. The level of public unease, or outright distrust, of government's handling of pesticides is such that establishment of a pesticides advisory board without careful planning and extensive consultation, would be, at best, a long-shot gamble with the credibility of government in relation to pesticides at stake.

A Statement by the Canadian Environmental Advisory Council (CEAC)

On

COMPLETION OF THE NATIONAL PARK SYSTEM IN THE NORTH

Prepared by: Monte Hummel,*

Introduction

The Centennial of Parks Canada in 1985 will present an opportunity for Canada and the international community to assess the extent and qualify of Canada's national park system. In addition, there will be a major international conference in Ottawa in 1986 to measure the world-wide implementation of the World Conservation Strategy which includes the identification and protection of national conservation lands.

On the one hand, there is no doubt that Canada contains some of the largest and most beautiful parks in the world. This country has been a leading party in international conservation initiatives such as the Commission on National Parks and Protected Areas (now chaired by a Parks Canada official) of the International Union for the Conservation of Nature and Natural Resources (IUCN), and the World National Parks Congress in Bali, Indonesia. The strong international role for Canada has been appropriate because we are regarded by literally all other nations as still having a unique opportunity to establish and maintain essentially wild conservation lands, especially in the North. Visitors to Canada often remark that this opportunity does not seem to be fully appreciated by Canadians, probably because it still is an option for us. There is nothing like losing your options to show you how precious they were.

The Present Situation: "Dynamic Inaction"

The cold fact is that the national park system is only 40% complete in Canada, and only 20% complete "North of Sixty". The longer we wait to complete the system, the less likely it is to be completed. Issues such as the Stokes Point proposal periodically jeopardize the proposed northern parks system. There have been past flourishes of political vision by ministers responsible for the national parks, but since 1978 the federal momentum to establish new parks has essentially stalled.

The establishment of a National Parks Reserve on the North Slope of the Yukon, and the progress made in negotiating a National Park Reserve in the northern part of Ellesmere Island, are the two bright spots in the North during the last five years.

Yet, in Council's view, the potential national recognition and interest-group support which the Minister's announcements on these initiatives could have attracted was not properly mustered by the Department. Rather, the Ellesmere Island announcement, like the Polor Bear Pass decision, largely served to point out how much more needs to be done.

Council members discussed the present northern parks situation with representatives of industry, native groups, non-government conservation organizations, the territorial governments, Parks Canada and other DOE officials, DIAND officials, and a former U.S. Secretary of the Interior who reflected back on what happened in Alaska. Members also reviewed reports and documents prepared recently by various agencies and organizations, including the results of a specific study which CEAC commissioned. Council ultimately concluded that the stage is set for a clear, unequivocal initiative to complete the national park system north of 60.

Parks and the Minister of the Environment

Council believes that a new parks initiative needs to be associated not just with DOE or Parks Canada, but with the Minister personally, in much the same way as the acid rain issue has been personally advocated.

The importance of personal leadership with respect to northern conservation lands was demonstrated in the Alaskan case. Here, Stuart Udall, former U.S. Secretary of the Interior, made it clear to his officials that he would be "judged by history" in terms of what he was able to accomplish regarding conservation lands. He determined to make sure such a judgement would be favorable. He did not ask whether certain things could be done by certain dates. He said they would be done. The job of his officials then became to plan to meet those deadlines, and to advise Udall on what he needed to do, as leader of the effort, to make sure his own deadlines were met. This push from the top caused some resentment, but on balance it had the remarkable effect of precipitating compromise positions and resolving problems thought to be insurmountable at the time — problems similar to those now facing Canada. Once it was made clear by the highest authority that decisions were going to be made by certain dates, there was a new urgency to participate and generate solutions.

It is important that such a clear statement of intention be perceived by all the parties as helpful and constructive, rather than "a gun to the head." In this sense, deadlines for decisions should be offered as reference points for making progress with full participation, as opposed to "stewing in our own juices" which tends to characterize the present situation.

Recent Initiatives

Council members have participated in a number of recent meetings in the North, and have reviewed a variety of current background papers regarding the northern park situation (see Bibliography). Parks Canada itself has generated some excellent documents which summarize the general factors now at play in the North, such as economic development, competition for land and sea-based resources, political evolution of the territorial governments, and native land claims. It is not the purpose of this statement to summarize all this information, but to offer a perspective on it. These papers make it clear that the land classification and inventory exercise has been sufficiently completed, with an assessment of conflicting uses, to go ahead and clearly state DOE's interest in parks.

The recent conservation initiatives by DIAND deserve special mention. Council feels that these moves are important and should be supported by DOE. In our view, DIAND's effort to develop a comprehensive conservation strategy for the territories should not be regarded defensively by DOE as a competing initiative; rather it should be seized by DOE as a unique opportunity — as a sympathetic move, from a department which has not always been sympathetic to conservation, to launch and accelerate those conservation lands proposals for which DOE is responsible, most notably national parks. Council certainly supports Parks Canada's assessment that: "If park initiatives are to be included and adequately considered in DIAND's planning approach, they should be identified soon."

The Task Force on Northern Conservation which was recommended by approximately 80 delegates to a March 1983 meeting in Whitehorse, was approved by the Minister of Indian Affairs and Northern Development and included members from DOE. There is, therefore, reason to expect the recommendations of this Task Force to be consistent with the intention of the Department of the Environment. The Task Force is expected to report to the Minister of Indian and Northern Affairs in November 1984.

The Economics of New Parks

While the political and environmental attractiveness of creating new national parks may seem obvious, the documentation reviewed by Council appeared to be deficient or silent

on the matter of economics. Therefore, Council undertook a separate study which included this aspect of establishing new parks.²

On the basis of that study, we have concluded that it would be difficult to make a traditional financial cost/benefit argument for establishing national parks in the North. Information on likely costs or future revenues is necessarily inexact and dependent or many assumptions. For example, only "guesstimates" of the short-term or long-term opportunity costs associated with mining and hydrocarbon development can be prepared based on assumptions regarding available resources and future economic policies. Nevertheless, there is an economic argument to be made for parks in the North.

On a general level, Council feels it is important for Canadians to know that Parks Canada "works in the black". In 1981-82, for example, Parks Canada spent \$260 million, but in the same period visitor spending attributable to parks amounted to \$290 million (including \$36 million in foreign earnings). The direct and indirect positive impact on the national economy in terms of additional income was estimated to be \$740 million. The impact, in the form of revenue, resulting from total sales of goods and services was valued at \$1.8 billion. The total activity created the equivalent of over 38,500 personyears of employment.

We are not suggesting that these aggregate findings be carried down to the individual park level, because obviously the system is made up of some individual economic "winners", and some "losers". However, as far as the parks system as a whole is concerned, Council suggests that Parks Canada will still "make a profit" when the system is completed in the North.

It is Council's view that, in the case of the national parks system, the "whole" is greater than the sum of the parts. Even if new northern parks were, as individual parts, economic "losers", the impact on Canada's international image by the addition of these parks, would probably increase the "profit position" of the overall national park system.

On a territorial basis, the park question is an integral part of the overall tourism concern. In the Yukon during 1981, for example, it was estimated that 15-30% of the 386,000 person trips had some contact with Kluane. During a three-year period, Parks Canada spent more than \$8 million on the operation of Wood Buffalo, Nahanni and Auyuittuq. Of this, 63% was spent in the NWT, directly benefiting Fort Smith, Fort Simpson and Pangnirtung. More than \$4 million in economic benefit from expenditures by park visitors and employees' salaries was spent in NWT communities. In 1979 alone, Parks Canada created 41 full-time and 13 seasonal positions in the three parks, and 98 firefighting jobs in Wood Buffalo. An

¹ National Parks Northern Strategy, National Parks System Division, Parks Canada, May, 1982.

² Horseman, A.L., A Report on Selected Aspects of Parks Canada, May, 1983, Canadian Environmental Advisory Council.

estimated 410 jobs were created as a result of the park operations. The Action Plan associated with Northern Ellesmere Island National Park anticipates direct income for residents of Resolute Bay and Grise Fiord to be between \$58,000 and \$94,000 annually. With indirect benefits added, the total benefit package is estimated in the \$111,000 to \$160,000 range for the local communities. Even if these benefits cannot compete in scale with resource developments, they should not be written off as insignificant, particularly in far northern parks and for smaller northern communities — communities such as Grise Fiord which, at the time of the 1980 census, had a population just under 100.

In 1982-83 the three NWT park reserves had a total budget of just under \$5 million and gave 52 person-years of employment. For the same period in the Yukon, the corresponding figures were a little over \$2 million and 28 person-years of employment, although they are tiny by southern standards. these levels of employment and budget expenditure can be significant at purely local levels in the North. In many northern communities, a dozen or even half a dozen secure jobs would constitute a stable core of income, and would be most welcome. There is no reason why these levels of benefit cannot be enhanced by locally initiated businesses established to tap the direct and indirect economic benefits, and by the promotion of local residents into senior positions on the parks staff. For those who wish to continue living off the land, that option may be best maintained through establishment of a properly managed national park.

Of course, visitor use is only part of Parks Canada's overall goal. Some parks may serve their ecological purpose even if they never attract more that a trickle of visitors. In fact, it is probably quite appropriate, from a biological standpoint, that visitor use of northern parks never approaches what has been experienced in the South. Parks Canada's mandate after all is not to make money, but "To protect for all time those places which are significant examples of Canada's natural and cultural heritage and also to encourage public understanding, appreciation and enjoyment of this heritage in ways which leave it unimpaired for future generations."

Nevertheless, even though economics is not meant to be the prime motivating factor for creating new parks, DOE should not be too easily intimidated by the view that there are so few economic benefits associated with parks that they are not a relevant factor in decision-making. It is also essential to recognize that parks are based on renewable resources, and the economic benefits therefore continue for an indefinite time period.

A New Approach: "Dynamic Action"

Council noted that Parks Canada initially identified four general action options:

- 1. A Proposal-by-Proposal Approach
- 2. A Package Approach

- 3. A Regional Planning Approach
- 4. A Land Claims Approach.

The option favored by Parks Canada appears to be a fifth option, which could be called the *Comprehensive Approach*, and which integrates all the above approaches. The question remaining for Council is whether this is a decision to do everything or nothing, or whether it is a decision at all. Is it not just more of the same?

Council is not attracted to the so-called Package Approach, with clearly stated commitment and leadership by the Minister representing national park interests in the Cabinet, and by DOE as the lead agency in relation to other government departments.

To put some scope or limits on the package, and to make it achievable yet worthwhile, Council specifically recommends that immediate action be focused on the northern tier of the national park system. We realize that national parks are only part of the Department's conservation lands mandate, which includes wildlife areas. We realize further that the Department's mandate is only part of the broader federal government responsibility for other conservation lands such as ecological reserves, and that provincial governments have a vital role to play as well. However, the northern national park component is well-researched and ready to go. National parks are the conservation lands most readily recognized and accepted by the public and industrial interests. And by focusing on a component such as northern parks, conservation interests cannot be accused of unleashing an unreasonable "land-grab". None of this precludes further packages to meet commitments on wildlife areas and ecological reserves in the North, or for that matter, completing the national park system in southern Canada at some future date.

A bold new initiative by DOE in this area need not disenfranchise all other participants, or be perceived to do so. In the case of native claims, for example, by taking the parks only to the park reserve stage, effective withdrawal is achieved but land settlements are not jeopardized. Obviously, a more ideal solution would be to settle the land claims so that everyone knows where he stands. Another idea, tried successfully in Australia and the United States, would be to transfer ownership of the land to a native organization with a covenant requiring that a portion of the area become a national park. In any case, Council feels Parks Canada is on the right track by encouraging territorial governments, native organizations, and local residents to participate in the management of northern national parks. What may be needed more than anything else at this point is a dramatic expansion in the number of skilled negotiations deployed by Parks Canada in the North, negotiators who can openly work with others to include parks as an essential part of northern development, so that local concerns can be met in a sensitive way, while the national interest is still implemented.

The feelings and views of southern Canadians are an important part of this "national interest". We agree whole-heartedly with the efforts by DOE to work in a consultative, co-operative way with northern native groups and with the territorial governments. But in the process DOE may have inadvertently relegated to a non-participant capacity the hundreds of thousands of Canadians living in the southern part of the country for whom northern parks have a real meaning and value. Canadians have an almost mystical attachment to "the North". It is part of being a Canadian. Only a very small fraction of the Canadian population will have any hope of ever visiting a northern park, but it is very important to them that the parks be there. It is essential that their interest and support be tapped in any initiative to complete the northern segment of the national park system.

The time has come for a clear statement of specific intent to all Canadians, followed by specific action by DOE. Obviously, such an effort has to go forward in co-operation with other agencies, but the need for co-operation is no excuse for DOE to lose the lead or to allow its good work to founder through inaction.

The goal should be the announcement of the completion of the northern component of the national park system by bringing all land withdrawals to the stage of park reserves as the cornerstone of the parks' centennial celebrations in 1985.

Bibliography

Recent Northern Parks-related Documents Reviewed by Council

- 1. Summary Report: Working Group on Conservation of Environmentally Significant Areas, CARC, Third National Workshop, Yellowknife, June 1-3, 1983.
- 2. Presentation to the Working Group on Conservation of Environmentally Significant Areas, Dene Nation, for CARC Third National Workshop, Yellowknife, June 1-3, 1983.
- 3. *Conservation of Environmentally Significant Areas*, T.J. Kovacs, Parks Canada, for CARC Third National Workshop, Yellowknife, June 1-3, 1983.
- 4. The Identification and Evaluation of Environmentally Significant Areas in the NWT, G.R. Smith and John B. Theberge, for CARC Third National Workshop, Yellowknife, June 1-3, 1983.
- 5. The History and Future of Parks in the NWT: A Government of the NWT Perspective, A. Vaughan, for CARC Third National Workshop, Yellowknife, June 1-3, 1983.
- 6. A Report on Selected Aspects of Parks Canada, A.L. Horsman, for CEAC, 60 pages, May 30, 1983.
- 7. Parks Canada Issue Analysis, Northern National Parks (undated and confidential) Parks Canada, 1983.
- 8. Planning and Management of Environmentally Significant Areas in the NWT; Issues and Alternatives, J.G. Nelson and S. Jessen, discussion paper for CARC, May 1983.
- 9. "National Parks Benefit NWT", Parkscan, Vol. 4, No. 1, March/April 1983.
- 10. Northern Conservation Policy Workshop, DIAND, Whitehorse, February 27 Marsh 2, 1983.
- 11. *Northern Conservation Lands*, A position paper of the National and Provincial Parks Association of Canada, February 1983.
- 12. Canada's Special Places in the North: An Environment Canada Perspective for the 80's, Environment Canada, 1982.
- 13. Towards Comprehensive Conservation of Environmentally Significant Areas in the NWT of Canada, T. Fenge, CARC, Environmental Conservation, Vol. 9, No. 4, Winter 1982.
- 14. Land Use Planning in Northern Canada, DIAND, October 1982.
- 15. A Comprehensive Conservation Policy and Strategy for the NWT and Yukon, DIAND, October 1982.
- 16. National Parks Northern Strategy, Parks Canada, May 1982.

THE KEY TO THE FUTURE

by Louise Beaubien-Lepage,*

Will environmental problems be very different in the future? Only time will tell. We can safely assume both that some of our current problems will have been solved and that, by the turn of the century, we will still be facing environmental problems, some of which are likely to be totally new. But we should not ask ourselves whether future problems will be different, or less numerous: more to the point is whether or not the political process as it applies to environmental problems will be different from current practice.

We must remember that protection of the environment is basically and primarily a matter of political will. Although improved technology can help solve a great many problems, until a political decision makes them a priority and ultimately allocates the resources necessary to reduce or eliminate them, solutions remain theoretical. The political aspect of environmental problems comes into even sharper focus when improved technology is unavailable to soften the need for hard choices: for instance, if existing management techniques make it impossible to develop a tourist centre in a natural area without damaging it beyond repair, a choice will have to be made — and, it will inevitably be made at the political level.

Political decisions are usually based on public opinion, and that is where Canadians as a whole come into their own. Citizens are at once a motor of public opinion and a very important lever that Environment Canada must wield judiciously. Indeed, if Environment Canada can be said to have a constituency of its own, it is unquestionably the people of Canada as a whole. Yet, that constituency is far from having played its role to the full. If tomorrow is to be different from yesterday or today, it is public participation that will make the difference.

Unfortunately, we must admit that relatively few public participation efforts have succeeded so far. The reason is very simple: we have not fully developed effective reltionships with public groups. It takes more than dialogues and symposiums to develop a full partnership, and that partnership cannot be improved unless the role of the public groups is fully understood. The main objective of environmental citizens' associations is to transform people's attitudes toward the environment in order to influence the decision makers. It is an enormous task, requiring total dedication, the utmost enthusiasm and the deepest conviction... and, often, instinctive reactions that decision makers must learn to respect.

It would be bold to pretend we could accurately describe the relationship that should exist between Environment Canada and citizens' associations in such a short space. We can nevertheless emphasize that technical services must be offered and programs specifically developed to enable non-government organizations to become effective partners, and to allow them to improve our environment in more concrete ways. The required services and programs must be created promptly. They are the key to the future!

*Member, Canadian Environmental Advisory Council

TERMS OF REFERENCE

The Canadian Environmental Advisory Council was established in 1972 as an independent advisory body serving the Federal Minister of the Environment. A broad statement of objectives was initially set for Council, and that statement was refined and amplified periodically over the years. In 1983, in response to public interest. Council undertook preparation of a more complete statement of its role. The expanded Terms of Reference were developed in 1983 and early 1984 through a series of discussions within Council and between Council and the Minister of the Environment. They were approved by the Minister in April 1984.

This document does not signify a major change in the role of Council or its manner of operation. It is essentially a statement, based on the original objectives, of the practice which has been established through the years under the direction of several ministers. Council felt that identification of the six "specific functions" (Item 2) which Council can and has performed was particularly important, because they provide Council and the Minister it serves with a high degree of flexibility in setting priorities to meet changing needs.

Tom Beck Chairman

1. General Statement of Role/Rationale

The Canadian Environmental Advisory Council (CEAC) was perceived, at the time of its founding in 1972, as a means to promote communication and understanding among diverse interest groups in society, and between those groups and the Minister of the Environment. The practical means of implementing this role focussed primarily on the provision of advice by the Council to the Minister of the Environment.

The role and manner of Council's operation which have evolved since that time under several ministers have reflected the original concepts, but have also enlarged on them and made them more specific.

Council today is a body representing a cross-section of Canadians who are knowledgeable and concerned about the environment including social and economic ramifications. It operates in a confidential advisory capacity to the Minister of the Environment, providing judgemental, considered opinion which reflects the viewpoints of a wide spectrum of the public. It provides the Minister with an alternative to the advice provided by the Department of the Environment and other federal agencies, and to the advice of specific interest groups.

It has been clear throughout Council's history that it was intended to serve as an advisory body to the Minister rather than as an organization with a high public profile, taking and promoting positions in public forums. Council's public role, in terms of activities such as the publishing of reports, has therefore been secondary to its primary function of providing advice to the Minister of the Environment on a confidential basis. The public role has been played only when such action did not compromise but supported the main responsibility of advising the Minister.

The spirit in which Council operates is exemplified by the following statement which appeared in a 1981 description of the role of Council:

"Being neither a public interest group or an agent of any group, nor a part of the Department, but the Minister's advisory council reporting directly to him, the role of the Council is to speak as independently and forthrightly as possible. It is not simply to tell the Minister or the Department or the public of Canada pleasant, uncontroversial things but to "tell it as we see it" and thus at times its comments may be irritating, unpleasant or embarrassing."

2. Specific Functions

- 2.1 To provide advice to the Minister of the Environment, as requested, on issues relating to the Canadian environment and on environmental matters in general which are of concern to Canada.
- 2.2 To bring to the attention of the Minister, and to provide advice on, environmental issues which Council perceives to be of public concern on a regional, national or international level.
- 2.3 To advise the Minister of the Environment on impending issues and problems in the environmental field; on social and economic trends and their environmental implications; and on principles and priorities related to long-term renewable resource/environmental management.
- 2.4 At the request of the Minister, to provide advice on improving the effectiveness of departmental activities.
- 2.5 In consultation with the Minister, as appropriate, to promote public concern with, and knowledge of specific environmental issues through publication of reports, sponsorship of conferences, and related activities.
- 2.6 At the option of the Council, to provide advice to officials of the Department on issues or policies which could ultimately be of concern to the Minister.

3. Relationships

Council shall be independent of the Department and shall provide advice directly to the Minister.

Normally the views of Council *per se* are conveyed to the Minister by the Chairman, or in his absence, by a vice-chairman. A direct relationship exists between the Minister and members during meetings of Council in which the Minister participates. The Minister may also call on members for their individual advice.

An open and frank exchange of views and information is maintained between the Council and the Department, with the proviso that advice from the Council must initially be conveyed to the Minister on a direct and confidential basis.

4. Membership

A maximum of 16 members shall be appointed by the Minister, in consultation with the Chairman of Council. Appointments are normally for a three-year period, subject to earlier termination by either party, and may be renewed or extended.

Members are selected to provide a broad and balanced range of knowledge and experience, and geographic representation. The knowledge and experience of Council members should also reflect current or impending priority issues at any given time. Members should have gained recognition for expertise and judgement in their fields, because the weight given to Council's views is derived from the collective stature of its members.

Members shall serve as individuals acting in their own right and in the national interest, not as representatives of specific interest groups or of regions.

The following shall not be eligible for appointment to Council: members of parliament, and members of provincial and territorial legislatures; federal, provincial and territorial public servants; members of regulatory boards, and officers and directors of crown corporations.

5. Chairman and Vice-Chairman

A chairman shall be appointed by the Minister, from among the members of Council.

The Chairman is responsible to the Minister for the substantive activities of Council including the provision of formal advice in the form of letters, statements and reports.

The Chairman presides at all meetings, and during the interval between meetings, makes decisions regarding Council's program in order to meet exigencies, subject generally to subsequent confirmation by Council.

The Chairman provides overall direction to the Secretariat.

The Chairman, with the approval of the Minister, shall appoint not more than two vice-chairmen from among the members of Council. A vice-chairman performs the duties of the Chairman in his absence, and such other duties as the Chairman may, from time to time, assign.

The appointments of a chairman and vice-chairmen are normally for a three-year period, subject to earlier termination by either party, and may be renewed or extended.

6. Meetings of Council

Council meetings are devoted to, in particular, preparation of statements of advice to the Minister based on examination, review and discussion of issues.

There shall be a minimum of three meetings of the full Council in every fiscal year, although Council is normally expected to meet 5 to 6 times per fiscal year.

Provision shall be made for the Minister to participate in all Council meetings.

Council endeavours to arrive at decisions via consensus.

7. Executive Committee

The Executive Committee shall consist of the Chairman and up to two Vice-Chairmen. One or two other members of Council are normally invited to attend meetings of the Executive Committee as guests.

Meetings shall be held at the call of the Chairman, normally during the period between full meetings of Council.

8. Budget

The Council's fiscal year shall be from April 1 to the following March 31.

The Council's human and financial resources shall be provided for in the budget of the Department of the Environment, including provision for the following:

- meetings of Council, the Executive Committee and working groups or project committees;
- honoraria and expenses of members;
- salaries of part-time and full-time Secretariat staff;
- travel expenses for staff;
- contractual services;
- publication of Council reports;
- sponsorship or participation in conferences, workshops, etc.
- other requirements such as telecommunications, equipment, materials, rentals, etc.

The budget is recommended by Council for approval by the Deputy Minister of the Department.

9. Honoraria

Honoraria for the Chairman, Vice-Chairmen and Members shall be paid according to rates approved by the Governor General in Council.

Payment of the honoraria shall be made to the Chairman, Vice-Chairmen and Members for time devoted to meetings of Council, meetings with the Minister, meetings of the Executive Committee, meetings of working groups, project work which has been approved in advance by Council or by the Executive, and to the Chairman and Vice-Chairmen for time devoted to management of Council. Required travel time is included.

Maximum honoraria payments on an annual basis for the Chairman, Vice-Chairmen and Members shall be established by the Minister at the time of appointment, and confirmed or adjusted in relation to Council's annual work plan and budget.

10. Expenses

Travel expenses shall be paid under the current regulations approved by Treasury Board.

Secretarial and other non-travel expenses which are incurred by members must be anticipated in advance and covered by service contracts.

In the case of the Chairman, arrangements for secretarial support other than that provided by the Council Secretariat shall be made on an annual basis by service contract.

11. Secretariat

The Department shall make provision for an Executive Secretary and adequate support staff to serve Council, with the appointments being subject to approval by Council.

The Executive Secretary shall be responsible to the Chairman of Council for all policy and program matters relating to Council, and responsible to the Deputy Minister for the administration of the Secretariat including the financial affairs of Council and provision of administrative support.

The Executive Secretary shall be responsible for the day-to-day operations of Council, and shall direct, manage and control the Council's human and financial resources.

12. Office Space and Administrative Support

The Department of the Environment shall provide adequate office space for the use of Council and the Secretariat in the Department's headquarters building with ready access to the Minister's office.

The Department shall provide administrative support services including typing, photocopying, etc. to the Secretariat.

SUMMARY OF RECOMMENDATIONS FOR ACTION BY INDIVIDUAL COUNCILS

The Public Role in Setting and Enforcing Environmental Standards

Recommendation No. 1

"The joint Advisory Councils that the Canadian Environmental Advisory Council undertake an investigation and review of alternatives to existing methods of regulating and enforcing environmental standards.

Explanation:

The Economic Council of Canada has recommended the use of economic rewards and penalties as alternatives or supplements to environmental regulation.

Professor Lucas has pointed out the weaknesses of the existing Criminal Law Model as the basis for all existing environmental regulation. Legal alternatives, such as contract law, should be investigated for their strengths and weaknesses and applicability to regulation and enforcement of environmental standards in Canada.

Because of the universal nature of legal and economic alternatives to existing regulatory processes it would be appropriate for the Canadian Environmental Advisory Council to support such a recommendation."

Recommendation No. 2

"That each council review ways and means for public input in the process of establishing and reviewing environmental standards. Standards include maximum contaminant levels in ambient air and water as well as maximum levels for contaminant emissions into air and water.

Explanation:

The process of establishing environmental standards is not solely a scientific or technical matter. Significant value judgments are involved as to what objectives to pursue and generally what degree of risk to accept.

Public consultation can provide important input on this basic question of acceptable degree of risk. It can also reinforce accountability in environment officials responsible for standard-setting.

Public involvement in standard-setting is a two-way process in that it can help to educate and inform the public on the diffidulties and complexities of standard-setting and enforcement of standards. Apparent public suspicion about the adequacy of standards and about apparent lack of vigour in enforcement, may be reduced."

Report by the Science Council: "Canada's Threatened Forests"

Recommendation No. 3

"In its statement "Canada's Threatened Forests", the Science Council of Canada recommends greater government participation in the area of Research and Development (\$650 million per year for reforestation and silvicultural treatment, and \$500 million for forest protection by 1987).

In view of the substantial increase in forest exploitation, the provincial Environmental Advisory Council are surprised that the report:

- ignores all aspects of recovery and recycling of paper;
- accepts, without criticism, the proposed increase in exploitation of one of our most important resources without undertaking a comprehensive study of the potential harvest sustained in natural ecosystems.

Therefore, the provincial and federal Advisory Councils recommend that the Science Council of Canada make an effort to further integrate the environmental dimension in forest exploitation and explore the avenues of conservation, recovery and recycling of resources."

SUMMARY OF WORKSHOP ON ROLE OF ENVIRONMENTAL COUNCILS (1983 ASSEMBLY)

Dr. P.F.M. McLoughlin, a Vice-Chairman of the Canadian Environmental Advisory Council, had served as chairman for the sessions on The Role of Environmental Councils. At the conclusion of the discussion in plenary session, he presented a summary of the main points which were brought out through the various sessions.

Following the conclusion of the Assembly, Dr. McLoughlin was asked to prepare an expanded summary of the main ideas and directions which emerged during the Workshop. The following is therefore not a formal part of the proceedings, but has been included as a useful reference and reminder to participants.

One of the clearest themes consistently intruding upon, but at one enriching, the discussions on the role of councils was the basically non-homogenous nature of councils. No two are alike. The group recognized the immense institutional, social, resource availability and other qualitative differences among the various provinces and territories. Within any one council's jurisdiction as well, its dynamics — people, politics, etc. ...enforce adaptations and changes over time. While agreeing that no one council is the ideal model, the group was also very aware that an advisory group or council must adapt to its evolving circumstances to remain effective. It must keep up with, if not actually anticipate, its own environment. The mutual recognition of this diversity, in turn, generated further levels of inter-council understanding.

There was also a consensus on the basic roles which councils should assume, recognizing that any one council, at any given point of time, would probably not be emphasizing all five:

- 1. The provision of policy advice to the minister, with an emphasis on longer-term issues and dynamics;
- 2. Work on specific environmental issues, particularly those specified by the minister, including public hearings;
- 3. The route to the minister for the expression of public opinion;

- 4. The presentation of issues to the public, including adequate information to ensure credibility in the decision making process.
- 5. The provision of technical advice to the minister. (Councils' composition generally can provide a breadth and depth of skills and experience with respect to an issue beyond the normal mandate of any given government department.)

Resulting from these deliberations was the very real awareness that members of any particular council learned more about themselves as a result of this exchange of views on the role of councils.

The issue of whether or not a council can serve, simultaneously, both the minister and the public was resolved satisfactority. There is no real contradiction as long as the council does not become an advocate for the public, including specific interest groups; as long as confrontation with the minister is avoided; and as long as the minister's confidence is retained.

These deliberations led to general agreement that what is really needed on councils is a great deal of common sense and world experience. This common sense can be brought to bear collectively, and far more quickly than a group of more specialized technicians in a government department.

Indeed, the core features of an effective council, regardless of its combination of roles, were agreed to be the following:

- (a) The council must give independent advice to the minister.

 To do this it not only must be free to do so, but also must be seen by the public to be independent.
- (b) A council's recommendations to the minister must be technically sound, regardless of how that soundness is substantiated.
- (c) Councils must address priorities, as reflected in ministerial requirements, public opinion, and any technical parameters.
- (d) Councils must be financially independent at a minimum satisfactory level.

We are entering a new era. Numerous speakers commented on various aspects of the changes underway in our society, noting that we are in a new and dynamic technological system, and are in need of new institutions, new ways of making decisions. We are in need of complete restructuring of some aspects of our society and of our economy. Being an environmentalist under these dynamic circumstances is quite a different things from being one up until now. These qualitative changes require a great deal of thought as they relate to councils' roles.

Councils, therefore, must be able to influence the decision-makers, particularly by strengthening the influence exerted by their own ministers. If a minister can convince his cabinet colleagues that they will gain or lose public support by the effects of their decisions on environmental quality, then councils are giving ministers the ammunition to move a cabinet or caucus in the right direction. Given the qualitative structural changes already moving our society in new and unknown directions, councils have a heavy responsibility to their ministers, to their province/territory, and to their country.







1984-85

Canadian

Environmental

Advisory

Council

Review of Activities





Canadian

Environmental

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Council

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary
Canadian Environmental Advisory Council
c/o Environment Canada
Ottawa, Canada
K1A 0H3

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council (CEAC) was perceived, at the time of its founding in 1972, as a means to promote communication and understanding among diverse interest groups in society, and between those groups and the Minister of the Environment. The practical means of implementing this role focused primarily of the provision of advice by the Council to the Minister of the Environment.

The role and manner of Council's operation which have evolved since that time under several ministers have reflected the original concepts, but have also enlarged on them and made them more specific.

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The spirit in which Council operates is exemplified by the following statement which appeared in a 1981 description of the role of Council.

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Ottawa, Canada K1A 0H3

September 12, 1985

Minister of the Environment Ottawa. Canada

Dear Minister:

I am pleased to submit to you the Review of Activities of the Canadian Environmental Advisory Council for the 1984-85 fiscal year. This Review documents the main activities of Council during the 12-month period from April 1, 1984 to March 31, 1985.

Council addressed a wide range of topics during the year, a number of them prompted by your requests for advice. There was a particular focus on the field of environment-economy relationships. As stated in this report: "Council recognized that understanding and accepting the interactions between economic performance and environmental quality are fundamental to an improved stewardship of the natural environment, and, therefore, part of the solution to all environmental problems."

Council pursued the objective of gaining wider understanding and acceptance through a variety of activities. They are described in this report, but I would like to draw your attention to one in particular: the study which was completed at year-end on environment-economy linkages. The study will help to chart a future course of action by Council. Of even more importance, we hope that it will aid and encourage many groups, agencies and organizations in their search for greater understanding. This vital area of interaction demands both individual and collective effort by all concerned, because it affects not only environmental quality and economic performance, but also the health and well-being of all Canadians.

Yours sincerely,

For Beck

Tom Beck



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COUNCIL OPERATIONS

Membership

The policy of stressing the appointment of new members rather than extending the appointments of current members created another year of change in the make-up of the Council. The fiscal year began with nine members serving on Council. Although membership had dropped to 7 early in the year, it grew to 10 by year-end. In total, five new members were appointed, while four either completed their terms, or resigned.

Mr. Tom Beck of Calgary, Alberta, continued as Chairman through 1984-85. Dr. P.F.W. McLoughlin of Comox, British Columbia, completed his appointment as Vice-chairman. Appointment of a new Vice-chairman was pending at year-end.

Other members who completed their service on Council during 1984-85 were:

Ms. Susan Holtz, Ecology Action Centre, Halifax, Nova Scotia;

Mr. Trevor G. Jeanes, Vice-President, Woodlands, Balco Industries Ltd., Kamloops, British Columbia; and

Dr. T. Hancock, M.D., Associate Medical Officer of Health, Department of Public Health, Toronto, Ontario.

The following members were appointed to Council during the year:

Dr. Shirley A.M. Conover, Senior Scientist, Environmental Division, Hardy Associates Ltd., Dartmouth, Nova Scotia;

Mr. John L. Fryer, National President, National Union of Provincial Government Employees, Ottawa, Ontario;

Dr. Joseph A.F. Gardner, Professor of Wood Sciences, Faculty of Forestry, University of British Columbia, Vancouver, British Columbia;

Dr. Lorne Giroux, Professor of Law, University of Laval, Laval, Québec; and

Dr. Stanley J. Rowe, Professor, Department of Crop Sciences and Plant Ecology, University of Saskatchewan, Saskatoon, Saskatchewan. Council recommended more appointments late in 1984-85. These appointments were pending at the end of the fiscal year. A list of members at year-end is included in this Review as Annex A.

Action was also taken during the early months of 1984-85 to follow-up on an initiative started late in the previous year: the preparation of "Guidelines on Conflict of Interest Situations". Members felt that because of the circumstances under which they served — as part-time, semi-voluntary advisers with other primary employment and active roles with other organizations — a set of guidelines was needed. Without guidelines, members could find themselves in real, apparent, or potential conflict of interest situations.

The objective of the guidelines was to maintain the credibility of Council as an independent, knowledgeable body by avoiding not only the reality but the perception of conflict of interest. While the guidelines were considered useful, it appeared that they would be particularly valuable for new and potential members.

The guidelines that were adopted by Council and approved by the Minister appear in this Review as Annex B.

Meetings

Council again held a limited number of meetings because of budgetary restraint. Five full meetings of Council were held — all in Ottawa. The usual practice of holding at least one meeting outside of Ottawa to gain first-hand knowledge of local circumstances and environmental issues was suspended during 1984-85. The meeting schedule was further limited because plans were cancelled for an Assembly of Environment Councils of Canada.

The Minister met with Council during two of its full meetings and with the Chairman on several occasions.

Six formal executive meetings were held during 1984-85, one of them by conference telephone call. Conference calls were also used occasionally during the year for consultations among members on specific issues or studies.

Publications

One of Council's priorities during 1984-85 was to catch up on the backlog of unpublished Council reports, which dated back as much as three years. By year-end, six reports had been edited and printed, leaving a backlog of only one. The published reports included a review of Council's activities and other studies or documents reflecting the results of efforts by Council as a whole, by an individual member or group

of members, or by independent sources on behalf of Council. The reports did not encompass all Council's effort, a large part of which consisted of oral or written advice to the Minister.

Council published the following reports during 1984-85:

 Sustainability of Farmed Lands: Current Trends and Thinking, by C.F. Bentley and L.A. Leskiw.

This is the report of an overview prepared for Council. Reference was made to it in the 1983-84 Review under the title "An Overview of Current Trends and Thinking Regarding the Sustainability of Farmed Lands, with Emphasis on Western Canada."

- Water Management Problems in the Third World: Lessons for Canada, by Dr. P.F.M. McLoughlin. This report was based on a paper presented by the former Vicechairman of the Council to a 1982 Environment Week symposium on water.
- Review of Activities 1981-82; 1982-83.

Publication of this Review marked a departure from the previous practice of reporting on a biennial and calendar year basis. Future reviews of activities will cover one fiscal year.

The above review included (as annexes) extracts from, or summaries of, several reports that had been published or prepared during the period. It also contained one special article that did not appear in other published Council documents: "A Perspective on the Canadian Environmental Advisory Council", by Council's former Associate Secretary, Dr. J.K. Fraser.

 Report of the Eighth Assembly of Environment Councils of Canada.

The Report summarized the activities and discussions of the 1983 Assembly including, in particular, discussions entitled "The Role of Councils" and "The Public Role in Setting and Enforcing Environmental Standards".

Selected Papers from Assemblies of the Environment Councils of Canada 1975-1980.

CEAC published this compendium at the urging of participating provincial environment councils. It featured papers selected from the first five assemblies or annual

meetings of the federal and provincial environment councils. The report included the following papers:

- Some Environmental Considerations in the Planning, Construction and Maintenance of Northern Roads with Relevance to the Mackenzie Valley Highway", by Ian McTaggart-Cowan;
- "Reflections on Land Use Issues Facing Canadians", by James W. Maxwell;
- "Environmental Impact Assessment Policies and Procedures: Concerns of 1978", by D.S. Caverly;
- "The Effects of Hydro Development on Rivers", by R.W. Newbury; and
- "The Pittston Proposal an Exercise in Coastal Zone Management", by D.J. Scarrett.
- Terms of Reference, Canadian Environmental Advisory Council.

The detailed description of Council's role, developed by Council during 1983-84, was published in a convenient form for reference.

The complete list of Council publications to date is included in this Review as Annex C.

Secretariat

No changes occurred during the year in the two-person Secretariat, which Environment Canada supplied to support Council's operation. The Secretariat continued to give priority to providing both administrative services and information and research in support of activities or studies undertaken by individual members and Council as a whole.

Editing, design, and printing arrangements for the six Council reports required a major effort during the year, as did efforts to develop a flexible approach to work-planning that would reflect rapidly changing priorities, and be in tune with the Secretariat's limited resources.

COUNCIL STUDIES AND REVIEWS

This section of the Review contains summaries of Council's activities that were either of particular significance, or to which Council has devoted a considerable part of its time and resources. Some of the activities reported here were undertaken at the request of the Minister, while others reflect Council's initiatives. Some topics to which Council either devoted less time or were of lower priority are grouped under the heading "Other". A number of subjects that appeared on Council's agenda, but which were less important or did not require specific action by Council are not included.

Environment-Economy Relationships

This broad subject continued through 1984-85 as the first priority in Council's program. Council recognized that understanding and accepting the interactions between economic performance and environmental quality are fundamental to an improved stewardship of the natural environment and that such understanding and acceptance are therefore part of the solution to all environmental problems. Within Council's own program, members frequently noted the relevance of the relationships between the economy and the environment to the specific issue under discussion.

Council's main approach to this subject has been to try to better understand the relationships and, where possible, to encourage and support efforts by others. Council's main initiative during the year was to commission a study on specific environment-economy linkages. Members became interested in this focus as a result of two workshops held in 1983-84 which served as a first step in exploring these linkages. Late in 1984-85, when funds could be allocated, Council undertook a study to identify "the known, significant linkages between environmental quality and economic performance". Council felt that this study would both enable discussion to move from a broad conceptual or policy level to specifics and, subsequently, make it possible to identify case studies in existing literature that would provide actual dollar cost or value figures in relation to some of the specific linkages.

The study was completed at year-end, and further action in 1985-86 will be based on Council's assessment of the findings of the study.

Council was involved in a number of other activities concerning environment-economy relationships during the year. They included:

 participation by the Chairman in a consultation meeting on the environment and the economy (This meeting was called by the Minister and included representatives from industry, labour, public interest groups, and universities.);

- initial contact with the World Commission on Environment and Development, including discussion of the Council's possible involvement in its work;
- support for a symposium on "The Economics of Environmental Protection", sponsored by the Alberta Chapter of the Canadian Society of Environmental Biologists; and
- briefings on related projects, including the meeting of Environment Ministers of Summit Countries; the Conference on Environment and Economics, sponsored by the Organization for Economic Cooperation and Development; and the "Economy, Jobs and the Environment" consultation project, developed by the Niagara Institute and Environment Canada.

Reports on two other related Council activities follow.

Consultations with Industry

As it began to explore environment-economy relationships, Council recognized the need to focus both on the adequacy of consultation among government, industry, and the public on environmental issues, and on ways in which a greater environmental leadership role by industry could be encouraged. It was also noted that the original proposal to establish CEAC drew attention to the need for improved communication between diverse groups in society, specifically groups representing industry and those representing environmental protection.

A number of activities related to this topic were undertaken in 1984-85. The Chairman attended a consultation meeting with leaders of industry that the Minister hosted. The Chairman also participated in the World Industry Conference in Versailles, France, on Environmental Management. This conference was jointly sponsored by the United Nations Environment Program and the private sector. In addition, Council identified a number of environmental leaders in industry and recommended industry representation at environmental workshops and meetings.

Initial planning was done for a CEAC-sponsored workshop or conference to explore improved industry participation in environment-related consultations, and ways in which to inspire a greater leadership role by business and industry. It was noted that there is increasing evidence of industries going beyond the minimum legal requirements for environmental protection and that these examples of enlightened self-interest deserve greater recognition.

One small informal meeting was held late in the year with representatives of the Canadian Manufacturers Association. This meeting laid the groundwork for further joint efforts by CEAC and the Association in 1985-86.

Royal Commission on the Economic Union and Development Prospects for Canada

Council had submitted a brief to the Commission in 1983-84 that commented on economic policy from an environmental perspective. The brief noted that a direct linkage exists between the long-term health of the economy and the environment and made some preliminary recommendations to the Commission.

Plans had been made to follow-up in 1984-85 with studies to provide more detailed recommendations to the Commission. Unfortunately, Council's efforts had to be scaled down because of other priorities. Several members and former members submitted briefs as individuals.

In response to the Commission's initial report, "Challenges and Choices", and to the Commission's request for further views, Council confirmed its views on the relationships between a healthy economy, a healthy society, and the quality of the environment. Council also noted that the mounting evidence on the importance of these relationships would be examined at the world level through organizations including the World Commission on Environment and Development, and it urged that the Commission also examine the evidence.

Science Policy

There had been a periodic concern among Council members regarding the adequacy of scientific capability in Environment Canada, and CEAC had periodically reviewed or commented on science capability or performance. This concern was highlighted again in 1983-84, and Council undertook to update earlier assessments. This work was completed late in 1984-85.

Council expressed concern that the scientific programs of Environment Canada have been eroded over the years and that this erosion applies to both in-house and externally-supported programs. Council is also concerned that government commitments to reverse the decline of Canadian science in general need to be applied to the environmental sciences because of the demands which it appears will be placed on them. It was noted that many environmental issues are complex and poorly understood, and that access to scientific knowledge is essential. One example offered was the movement of toxic chemicals in waters and soils, their sources, rate of migration through the food chain, and their individual and collective effect on human health and the environment.

Council emphasized that environmental research is part of Environment Canada's mandate; that significant improvements in environmental research can be made, even in times of fiscal restraint; and that steps could be taken to develop more effective links with the provinces, industry and the universities.

Environmental Non-government Organizations (ENGOs)

Late in 1983-84 the Minister asked the Council to review the Public Consultation Policy, particularly in relation to voluntary public interest groups. The review was completed in 1984-85. CEAC originally played a key role in organizing the first national meetings of the voluntary public interest groups. Recently, it has served both as an adviser to the Minister on ENGOs and on public consultation in general, and as an informal adviser to the ENGO National Steering Committee.

The Chairman and Vice-chairman were invited to attend the ENGO National Meeting and the Department's National Public Consultation Meeting. Council also reviewed reports and studies which had been prepared by other sources. Council made a number of observations in its review, including the need for effective two-way communication between the Minister and the Department and voluntary public interest groups. Council noted that these groups are not homogenous, that they have little hierarchical structure and, therefore, that the most effective communication will likely occur at the regional level. Council also urged that consultation with the groups be carried out continuously and made recommendations on appropriate funding.

Council pointed out that although it had reviewed only relationships with voluntary public interest groups, equal weight should be given to relationships with other sectors.

Drinking Water Quality

It had been apparent that water issues generally would be among the major environmental issues of the 1980s and that drinking water quality might become the major issue of concern in the eyes of the public. Council was represented at a conference on drinking water quality and, subsequently, stated its views.

In particular, Council urged that there be effective public consultation in setting standards or guidelines for the quality of drinking water. It noted that "everyone is at the end of a pipe or at the top of a well which delivers drinking water", and that members of the public, therefore, need to both understand the conditions that affect drinking water quality, and have an opportunity to express their views on the level and type of risk (if any) that they are prepared to accept.

Council also noted that given the division in responsibility among departments and between the federal and provincial governments, there was a particular need for co-ordination to avoid duplication of effort.

Nuclear Winter

While Council did not study the subject extensively, it has been included in this section of the report to reflect Council's view that the indicated after-effects of a nuclear war represent the greatest potential environmental hazard facing mankind.

Council was briefed on related work being undertaken by Environment Canada, on progress by the Royal Society of Canada and, ultimately, on the final report prepared by the Society. Council complimented the Minister on the decision to provide copies of the report to all Members of Parliament, and offered to participate in any follow-up activity.

Role of Council

Although Council had completed a review of its role during the previous year and a detailed statement of its terms of reference had been approved, discussions on this subject continued in 1984-85. Preparation of the detailed statement of Council's terms of reference may have contributed to a desire to explore alternative or broadened roles for it.

In response to interest expressed by the Minister in a further review of Council's role, CEAC obtained and reviewed background information on other national environmental councils, including those of the Netherlands and Brazil. The Council serving the Netherlands was of particular interest to members of CEAC, and a summary of information on that Council has been included in this Review as Annex D.

Environment Canada also undertook a separate review of the role of Council. Discussions between the Chairman and the Deputy Minister focused on the relationship between the Council and the Department, including the provision of adequate resources for Council's secretariat. Plans were made for a joint meeting of Council and the Department's Senior Management Committee.

Northern National Parks

In view of the planned observance of Canada's National Parks Centennial in 1985, Council brought forward again for attention the statement that it had prepared in the previous year, and which was developed from a study on the economic value of parks. It was Council's view that action should be taken to complete the national park system in the Yukon and Northwest Territories during 1985 by bringing the necessary land withdrawals to the stage of park reserves. Council noted that the key sites identified as potential national parks involve less than 5% of the land area. It also noted that major expenditures would not be required to establish them as park reserves and that the new parks would ultimately bring direct economic benefit through the tourism industry. The statement had been previously published in Council's 1983-84 Review.

Council was involved in a number of other activities related to national parks, including a workshop on planning for the future of parks. The Chairman participated in the workshop, which focused on the course of action for the next 100 years.

Sustainability of Agricultural Soils

Members of Council had been concerned for several years over indications of serious land use and soil degradation problems that could affect the future productivity of Canada's agricultural lands. CEAC's concerns were shared by the provincial councils, and in 1982 Council commissioned the first of two studies — an overview of current trends and thinking. This study was followed by a second in-depth one launched in 1983-84. The second study was completed in 1984-85, except for some minor revisions. An executive summary of the study report, entitled "Canadian Agricultural Land Base: Quantity and Quality", by Dr. Robert A. Hedlin and Dr. Daryl Kraft, appears in this Review as Annex E. The report reviewed the areas of concern regarding land use and soil degradation and noted a number of areas for which inadequate information exists and that require further research. Specific areas included: the rate of loss of agricultural land to industrial and urban use; cropping and tillage practices that will reduce soil erosion and maintain the level of organic matter in the soil; the causes and extent of soil salinity; the economics of liming soils to counter acidification; and the influence of technology on agricultural productivity.

State of the Environment Report

Council had been briefed several times in recent years on progress by the Department toward production of a State of Environment Report which would provide information to the public on trends and conditions in Canada's natural environment. Council had strongly supported preparation of such a report.

Because of problems being experienced in completion of the report during 1984-85, Council informally explored alternative funding and production possibilities through universities and the private sector. Members also reviewed draft material for the report and for a related document, "Human Activities and the Environment", being produced by Statistics Canada. Council discussed both reports with private sector representatives, and provided advice to Environment Canada and Statistics Canada on the potential demand and marketing of the reports.

Environmental Health Research Priorities

The National Health Research and Development Program noted that environmental health research was a current area of interest and requested advice on future research priorities.

Council responded by identifying two general requirements and several particular areas toward which research should

be directed. Council urged that research be directed toward anticipated problems, not exclusively toward well-known "popular" problems because many threats to human health are cumulative, and time is required to reverse the processes (if indeed they are reversible). Also recommended was effective integration of research efforts, not only to make the best use of available research funds, but to reduce the time required to identify incipient environmental health concerns.

Particular areas that Council identified included: the long-term health effects of exposure to low doses of multiple chemicals, including hazards through drinking water; the effects of acid rain, including indirect effects through heavy metals in recipient soil and water; the increasing problems of indoor air quality; causes of breakdowns in the human immune system; the threats posed by inadequate sewage treatment; the possible effects on human health of multiple recycling; and the potential threat from new food additives and processes.

Federal Policy on Wildlife

At the request of departmental officials, Council undertook reviews of the new draft "Federal Policy on Wildlife". Council was generally supportive, and considered that the draft policy contained a number of fresh ideas. Council supported in particular the use of the "World Conservation Strategy" as an underlying principle for the new policy.

Council supported the inclusion of plants in the definition of wildlife because doing so reflects an ecosystem approach to conservation and focuses on man's use of the biosphere rather than on the narrow and more limited concept of managing wildlife populations.

Several members made suggestions on areas of the policy requiring elaboration or clarification, including native hunting of wildlife, more specific definition of endangered species, and the keeping or raising of wild animals in captivity. Council also urged that more specific attention be given to methods of implementing the policy.

Inquiry on Federal Water Strategy

In line with its view that water concerns would be among the major environmental issues of the 1980s, Council maintained contact during the year with the Inquiry, which had been appointed by the Minister. Members drew to the attention of the Inquiry the report on water management, published earlier by Council, and suggested possible participants in the Inquiry's hearings.

Council opted for meeting with the Inquiry rather than presenting a formal brief. That meeting took place in February 1985 and was organized as part of a regular meeting of Council. At that point, the Inquiry had met with provincial representatives, had held public hearings, and had commissioned a number of studies. The Inquiry briefed Council on the major concerns that had emerged through the public hearing pro-

cess, and Council noted a number of issues from its perspective. The discussion focused mainly on the theme of public advocacy in connection with water management, and public input to the process of developing water policy.

Enforcement Policy

In a discussion with the Minister on inadequacies in enforcement policy and practice, Council was asked to identify specific instances of non-compliance with environmental protection regulations. Members undertook to gather relevant data from several geographic areas and to review the work of the Law Reform Commission and other recent studies such as the one undertaken by the Environmental Council of Alberta. By year-end, the project was nearing completion.

In undertaking this study, Council recognized that there might be weaknesses in Environment Canada's mandate and in its specific legislative authorities. However, members felt that those weaknesses could best be highlighted by examining specific cases of non-compliance. Council also noted that it does not advocate enforcement of regulations as the only means of implementing environmental standards and requirements, but that laws should not be established which cannot, or will not be enforced.

Public Opinion Polls

Departmental officials briefed Council on a variety of current public opinion polls that related, at least in part, to environmental matters. The results confirmed Council's impression that environmental issues were maintaining their position as one of the major areas of concern among Canadians. The polls indicated that Canadians were unwilling to trade environmental protection for economic growth. In one poll, although battling the deficit was thought to be a priority by 88% of the respondents, battling air and water pollution was given a priority by, respectively, 96% and 94%. In another survey, a majority of respondents (64%) gave higher priority to environmental protection than to economic growth.

Members of Council felt that better use should be made of the results of public opinion polls in order to communicate public views to decision-makers, and that in-depth examination of some issues should be made through public opinon surveys.

Program Review

Issues related to the initial program cuts applied to Environment Canada were raised with Council by a number of groups. It was Council's view that it could not play a useful role in relation to program reductions that had already been made, except to ensure that the Minister was made aware of some of the key public concerns. Council also looked at alternative ways of providing some of the environmental services that had been dropped.

Council subsequently focused on the upcoming review of programs by the DOE Self-evaluation Study Team, appointed under the Ministerial Task Force on Program Review.

Other

Northern Priorities

During the early months of 1984-85, Council continued work on a proposal for developing "a sustainable northern economy from an environmental perspective". Council provided the Minister with some related documentation. After assessing progress being made through economic development agreements and reviewing plans for upcoming conferences and other initiatives, it was agreed that further work on the subject by Council might lead to duplication.

Youth and the Environment

A further discussion with the Minister was held early in the year, to conclude the dialogue started during 1983-84. Council recommended that Environment Canada follow the most cost effective course of action by working through existing organizations and programs that have a youth orientation. Specific reference was made to the Interchange on Canadian Studies Program under the Department of the Secretary of State

Environmental Assessment and Review Process

After reviewing proposed changes to the Environmental Assessment and Review Process (EARP), Council forwarded to the Minister a copy of recommendations that had been made after a previous review by Council. Council also offered to assist the Minister in any further action required to either streamline the Process, or resolve specific problems.

Hazardous Wastes

Council was briefed on progress and current problems in connection with hazardous waste disposal, particularly the site-selection process for waste disposal facilities. Included among the points raised were: the need to develop public trust; the need to clearly identify wastes that require special storage and treatment; and the advantages of including the disposal costs of waste in order to encourage recycling.

Acid Rain

Council's long-standing interest in the acid rain issue continued during the year. The Council offered to review and comment on specific issues or problems and urged that the federal government move to significantly reduce Canada's contribution to the problem. In Council's view, such a move, while not the ultimate solution, would diminish the impact on human health and the environment, and would strengthen Canada's position in international negotiations.

Environmental Awards and Symbols

Discussions on various categories of environmental awards and symbols carried over from 1983-84. Members had expressed particular concern about a proposal that Council play a major management role in relation to the proposed program. Council had supported some aspects, including regional awards for outstanding environmental performance by business and industry. Council was advised that the proposed program was being reviewed and offered to assist in any re-assessment.

Symposium on Environmental Ethics

Council provided advice on planning for a National Symposium on Environmental Ethics, including recommendations on participants and orientation. The Symposium was rescheduled for June 1985 and was sponsored by the Institute for the Humanities at Simon Fraser University, in co-operation with the University of Waterloo and Environment Canada.

Northern Conservation Task Force

There had been a continuing interest in the work of the Northern Conservation Task Force, appointed by the Department of Indian and Northern Affairs. It was Council's view that the work of this Task Force complemented Environment Canada's initiatives and Council's own proposal on Northern National Parks. Members reviewed and voiced support for the final report of the Task Force.

FUTURE PLANS

On the basis of work underway, and according to other indications, the following subjects will likely be part of Council's 1985-86 program. Additions will be made to the 1985-86 program as issues develop and, in particular, in response to requests by the Minister for advice on matters of current or emerging concern.

Environment-Economy Relationships

Further exploration of the complex interactions between environmental quality and economic performance will likely continue as a priority through 1985-86. In particular, Council will be looking at follow-up to its study on *environment-economy linkages*, in terms of work to be undertaken by Council, and efforts by other groups and organizations to encourage projects.

Consultations with Industry

Council plans to continue its efforts both to improve consultation among gouvernment, industry, and the public on environmental issues, and to explore more ways of encouraging industry to assume a greater environmental leadership role. It is expected that the initial meeting held in 1984-85 with representatives of the Canadian Manufacturers Association will lead to further discussions and, possibly, to a workshop or conference.

Program Review

Council offered to assist in the task force review of Environment Canada's programs. Council expects that it will be called on to provide views to the task force and/or to provide

advice to the Minister on implementing some of the task force's recommendations.

State of the Environment Report

Council is looking forward to the publication of Canada's first comprehensive national state of the environment report in 1985-86. A review of the report and consultation with those who will use it is planned in order to provide advice on refinements in the report format and the distribution of future issues.

Enforcement Policy

At year-end, work was nearing completion on the review of inadequacies in Environment Canada's enforcement policy and practice. This review should be finished early in 1985-86 and may require additional follow-up by Council.

Other

There are a number of other subjects on which Council action in 1985-86 is possible, but uncertain. They include making proposals related to public opinion polls and surveys and reviewing and commenting on several major studies, e.g., the report of the Inquiry on Federal Water Strategy, the report of the Royal Society on Lead in Gasoline, and the report of the Royal Commission on the Economic Union and Development Prospects for Canada (Macdonald Commission).

ASSEMBLY OF ENVIRONMENT COUNCILS OF CANADA

An assembly or conference of the federal and provincial environment councils was first organized and hosted by the Canadian Environmental Advisory Council in 1975. Since that time, hosting of the assembly has alternated among the operational councils, and the assemblies have generally been held on an annual basis. The exceptions were 1976 and the current calendar year, 1984. An assembly was planned for the 1984, but had to be cancelled when the host council was unable to make arrangements for it.

During the year, CEAC members discussed problems related to the assemblies with representatives of some of the provincial councils, and Council looked at alternatives to rotational hosting. These alternatives included contractual arrangements with an organization or individual and instituting registration fees to reduce costs to the host council. Members were concerned that the assemblies might be dropped. Therefore, CEAC took the initiative in organizing a meeting of Council charimen. It was hosted by CEAC in Ottawa, in December 1984.

All councils at the meeting strongly supported continuing the assemblies on an annual basis as a means of exchanging information and experience. The chairmen favoured continuing the hosting of the assemblies on a rotational basis among the active councils so that all council would have an opportunity to obtain first-hand knowledge of the environmental problems of other parts of Canada.

A number of details regarding assembly arrangements were discussed and agreement reached. A schedule was arranged for the next three years that would see assemblies hosted by Québec, Alberta, and New Brunswick.

It was agreed that while all councils could propose agenda topics, the final decision should be made by the host council. Topics proposed at the meeting for future assemblies included:

- transportation of dangerous goods;
- solid waste management (including recycling);
- ground water contamination;
- drinking water quality;
- water and regional planning;
- tourism and water;
- youth and environment;
- nuclear waste; and
- environment-economy relationships.

A list of the assemblies held to date and the major topics discussed at each have been included in this Review as Annex F.

MEMBERSHIP Canadian Environmental Advisory Council

March, 1985

Mr. T. Beck Calgary, Alberta Chairman

Dr. S.A.M. Conover Hardy Associates Ltd. Dartmouth, Nova Scotia

Mr. J.L. Fryer National Union of Provincial Government Employees Ottawa, Ontario

Dr. J.A.F. Gardner University of British Columbia Vancouver, B.C.

Dr. L. Giroux University of Laval Ste-Foy Québec Mr. B.A. Hubert Boreal Ecology Services ltd. Yellowknife, N.W.T.

Mr. M. Hummel World Wildlife Fund (Canada) Toronto, Ontario

Madame L.B. Lepage
Fédération des associations
pour la protection de
l'environnement des lacs
Montréal, Québec

Dr. D. MacKay, Professor University of Toronto Toronto, Ontario

Dr. J.S. Rowe University of Saskatchewan Saskatoon, Saskatchewan

Secretariat

Mr. Max McConnell, Executive Secretary

Dr. E. Fred Roots, Science Advisor

Mrs. Veena Halliwell, Administrative Assistant

Environment Canada Ottawa, Ontario K1A 0H3

Canadian Environmental Advisory Council GUIDELINES ON CONFLICT OF INTEREST SITUATIONS

In their capacity as confidential advisers to the federal Minister of the Environment, members of Council may find themselves in real, apparent, or potential conflict of interest situations. These situations are created by the conditions under which members serve the Minister: as part-time, semi-voluntary advisers who maintain other primary employment and active roles with other groups and organizations; and who have access to privileged information in oral and written form.

These guidelines were prepared at the request of Council's Executive in order to minimize uncertainly, particularly for new members, and as a means of identifying potential conflict of interest situations when new appointments are being considered. The objective is to maintain the credibility of Council as an independent, knowledgeable, non-partisan body. To maintain that credibility, not only the reality, but the perception of conflict of interest must be avoided.

- Privileged information which is made available to a member as an adviser to the Minister must not be used, or appear to be used for financial or other direct benefit to the member, his family or associates.
- 2. No conflict should exist between the private interests (employment, professional group, other organization, etc.) and the member's responsibilities on Council. When a conflict exists or may appear to exist between a member's private interests and a topic under review or discussion by Council which could be interpreted as providing financial or other personal benefits to the member and thus compromise the member's independent, the member must disclose the conflict of interest to the Chairman and/or Council as a whole, and offer to absent himself/herself from Council's action on that subject.

- 3. Members must not use their influence as Council representatives to advance proposals, either within Council's program of activities or outside of Council, which will be of direct financial or other personal benefit to themselves.
- 4. As a general rule, members should not initiate contract work with Environment Canada during their term on Council. Any proposals for such contracts should be discussed first with the Chairman and/or Council as a whole, and, if required, with the Minister.
- 5. Due to Council's non-partisan nature, and its role as a confidential advisory body to the Minister, members, during their term on Council, must not play an active public role on behalf of any political party. In this context, "public role" includes activities such as competing as a party candidate in an election, making public statements on behalf of a party, or equivalent activity. This guideline does not affect what might be considered the usual level of political activity by a citizen, such as holding membership in a political party, or canvassing.

The type of action to be taken on conflict of interest situations will be decided on the merits of each case, and could range from a simple statement of disclosure, through exclusion from discussions on the matter in question, to termination of the member's appointment.

Administration of these guidelines will be a continuing responsibility of the Executive Committee of Council.

August 16, 1984

LIST OF PUBLICATIONS

Annual Review 1973-1974. Part A — Activities 1973-1974 by Arthur Porter. *Part B — Problems and Priorities in the Canadian Environment* by Pierre Dansereau.

Annual Review 1975. Part A — Activities 1975 by Ian McTaggart-Cowan. *Part B — Significant Canadian Environmental Problems* by J.P. Nowlan.

Annual Review 1976. Part A — Activities 1976. Part B — The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A — Activities 1977-1978. Part B — The State of the Canadian Environment.

Annual Review 1979-1980. Activities 1979-1980. A Decade of Environmental Concern: Retrospect and Prospect by Donald A. Chant. Environmental Assessment and Review Process: Observations and Recommendations.

Review of Activities 1981-1982; 1982-1983.

Terms of Reference, Canadian Environmental Advisory Council. March 1984.

An Environmental Impact Assessment Process for Canada, Council Report No. 1, February 1974.

An Environmental Ethic — Its Formulation and Implications. Council Report No. 2, January 1975. By Norman H. Morse.

Harmony and disorder in the Canadian Environment. Occasional Paper No. 1. By Pierre Dansereau Council Report No. 3, 1975.

Environmental Aspects of Nuclear Power Development in Canada. Occasional Paper No. 2. By H.E. Duckworth, H.W. Arthur Porter and J.S. Rogers. Council Report No. 4, 1977.

Towards an Environmental Ethic, March 1977. By D.A. Chant.

Report of the Second joint Meeting of Environmental Advisory Councils. May 1977, Fort San, Saskatchewan. Council Report No. 5, March 1978. Produced in collaboration with the Saskatchewan Environmental Advisory Council.

The Management of Estuarine Resources in Canada. Council Report No. 6, March 1978. By Irving K. Fox and J.P. Nowlan.

Report of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council. Council Report No. 7, May 1978.

Ecotoxicity: Responsibilities and Opportunities. Council Report No. 8, August 1979. By Ross H. Hall and Donald A. Chant.

Report of a Meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Council Report No. 9, April 1981.

A New Approach to Pest Control in Canada. Council Report No. 10, July 1981. By Ross H. Hall.

Wildlife Conservation issues in Northern Canada. Council Report No. 11, October 1981. By Ian McTaggart-Cowan.

Water Management Problems in the Third World: Lessons for Canada. Council Report No. 12, March 1983. By Peter F.M. McLoughlin.

Report of the Eighth Assembly of Environment Councils of Canada. Council Report No. 13, May 1984.

Selected Papers from Assemblies of the Environment Councils of Canada 1975-1980. Council Report No. 14, March 1985.

Sustainability of Farmed Lands: Current Trends and Thinking. Council Report No. 15, March 1985. By C.F. Bentley and L.A. Leskiw.

THE CENTRAL COUNCIL FOR ENVIRONMENTAL PROTECTION IN THE NETHERLANDS

Introduction

Environmental protection is not only the concern of the government: it affects the community and its individual members too. In order to conduct a satisfactory environmental policy it is essential for the government to hear the views of everyone who is closely involved with developments in this domain. The Provisional Central Council for Environmental Protection was set up in 1974, and the word 'Provisional' was dropped from its title in May 1981 when the relevant section of the Environmental Protection (General Provisions) Act came into force.

Composition

A considerable number of organisations are represented on the Council. These include environmental organisations, employers' organisations, trade unions, the water boards and the various levels of government — provinces, regions and municipalities. There are also representatives from the Industrial Board for Agriculture, the Consumers' Association and womens' organisations. The Minister of Housing, Physical Planning and Environment has also appointed a number of experts to sit on the Council in a personal capacity.

Responsibilities and methods

The Council's most important task is to advise the Government, and particularly the Minister of Housing, Physical Planning and Environment, either on the Minister's own policy area or on environmental matters which fall primarily or even entirely under the responsibility of other ministers. For example, the Council has made recommendations on energy policy and on earth removal.

The Minister asks the Council for advice on all bills relating to environmental protection. The Council can also make recommendations on its own initiative. All recommendations are drawn up by Council committees, which may also include representatives of groups not represented on the Council and external experts on the subject in question. The definitive recommendations are finalised by the Council at a public meeting. After being submitted to the Minister they are brought to the attention of Parliament by the Council and usually published afterwards. If the Council cannot agree upon an unanimous recommendation the minority view is also included.

As well as making recommendations the Council is also responsible for making an annual survey of the state of affairs in the environment in the Netherlands. This is presented to the Minister of Housing, Physical Planning and Environment, but it also serves to keep organisations and interested members of the public informed. In form and content it is therefore aimed at a wide public, and as such published in book form by the Government Printing Office.

Finally, the Council regards it as one of its responsibilities to encourage more people to think about certain aspects of environmental policy; this is done by holding annual one-day discussions or seminars.

CANADIAN AGRICULTURAL LAND BASE: QUANTITY AND QUALITY

EXECUTIVE SUMMARY

There are many individuals involved in the management of agricultural land and the production of food. These include the men and women on farms; those engaged in agricultural research; those responsible for the many aspects of agricultural education; and those who manufacture the machinery, agricultural chemicals and other inputs utilized in crop and animal production.

These people constitute a team whose task has not been an easy one. It has often been made more difficult by the fact that our society has occasionally failed to understand food production problems or to provide the necessary support. In spite of the difficulties this team has achieved a remarkable degree of success in producing crops of high quality and in the maintenance of Canadian soil resources.

This is not to say the agricultural industry does not have to be concerned with maintaining a productive land base. The areas of concern are summarized below.

I. Amount of Agricultural Land — in eastern Canada the area of improved agricultural land has decreased by 2.5 million hectares or 25 percent since 1941. In all eastern provinces disappearance of land from agricultural use was chiefly because crop production was unprofitable. Much of this land has reverted to forestry and hence could be returned to agriculture should circumstances dictate.

In some regions located in Ontario and Quebec a significant portion of the improved land removed from agriculture was converted to urban uses. Much of this land was of high agricultural quality, suited to specialized crop and fruit production. Because of the unique soil and climatic attributes of these areas the actual and potential Canadian production of some crops is endangered.

The extent to which past industrial expansion and population growth consumed agricultural land is not precisely known. Without this information it is difficult to forecast future land conversion rates even if population and economic growth could be predicted accurately. It also makes it difficult to develop appropriate policies to deal with this problem.

II. Soil Degradation or Deterioration — The areas of concern are recognized but an accurate assessment of their seriousness is difficult. This is because such an assessment requires an appreciation of both the intensity of the problem and the land area affected.

1. Salinity

It has commonly been stated that the area of saline soils is spreading rapidly. An examination of the information supporting this point of view fails to substantiate it. Therefore, we were forced to conclude that spread of salinity is not rapid or widespread. The existing area of saline soils however is a continuing concern. Initiatives should be undertaken to more fully understand the problem with a view of improving agricultural productivity of these soils.

2. Soil Acidity

This is a major problem in much of the agricultural region of Canada. It can be effectively dealt with through the application of finely ground limestone. On very acid soils the initial cost, which is commonly in the range of \$200.00 to \$400.00 per hectare, represents a major investment that farmers may find difficult to afford. Once soils have been adequately limed the average annual cost of replacing the lime lost as a result of natural and main-induced acidification processes is normally less than \$10.00 per hectare. For most soils the cost is small relative to the returns obtained through increased crop production.

3. Loss of Organic Matter

Cultivation usually results in a decline in the amount of organic matter in the soil. This in turn increases susceptibility to erosion leading to a further loss in organic matter. On most soils the organic-matter content has stabilized at a new level. The adequacy of this new level varies depending on the actual amount of organic matter and its quality. These in turn are related to the cropping and tillage practices used.

4. Soil Erosion

A continuing concern is loss of topsoil by water erosion in all parts of Canada and wind erosion on much of the Canadian prairies.

Concerns regarding erosion are two-fold. Erosion results in reduced crop yields and leads to an increase in the cost of production. These costs are almost entirely reflected in a reduction in net farm income. On many farms they mean the difference between a profitable and an unprofitable enterprise.

Serious erosion is concentrated on a relatively small portion of the agricultural land area. These include wind erosion on sandy soils on the prairies and water erosion on more sloping lands in all parts of Canada. An assessment of the amount

of soil lost in relation to soil type and cropping practices merits more attention than it has received to date.

- **III.** Crop Yields and Cropping Practices The problems of soil degradation outlined above are related to our cropping and tillage practices.
- 1. Crop yields have been increasing steadily and there is every reason to expect that Canadian farmers will continue to make effective use of known technology and of new developments as they occur. Increasing yields should not be considered as proof that soil degradation is not serious.

Instead the relationships indicate that to date the degree and extent of soil degradation is insufficient to override the gains in productivity from improved technology.

- 2. Rotations which include perennial forage as a regular part of the cropping system could reduce erosion and maintain soil organic matter. Such cropping systems are realistic only where there is a larger ruminant livestock population than currently exists, or ever has existed, on most Canadian farms. Thus such rotations have never been widely practiced in Canada. This situation is not likely to change unless new, more profitable markets develop for beef and milk.
- 3. Most of the cultivated land in Canada continues to be used for annual crop production. Annual crops can be rotated so as to provide many benefits. These include reduced incidence of disease, more effective weed control and, where annual legumes are used, some reduction in nitrogen fertilizer needs.
- 4. Appropriate practices of crop residue management and conservation tillage could go far to maintain an adequate level of soil organic matter and reduce wind and water erosion. Such practices have not yet received an adequate level of acceptance across Canada. Difficulties associated with their

adoption include carryover of disease on crop residues, phytotoxic effects of residues, increased insect damage, reduced effectiveness of soil-incorporated herbicides and difficulty in obtaining a suitable seed bed for small-seeded crops. An intensified research program involving a team approach is needed in order to develop cropping and tillage practices that are effective in reducing erosion and which can be adopted with a minimum of difficulty.

In short what is needed is:

- (a) A more careful assessment of the amount of farmland taken by urban expansion is required before new land use regulations are imposed. These reviews are unique to each urban area because of differing economic and regulatory environments.
- (b) Intensified studies of the causes and extent of salinity on the Canadian prairies with particular reference to the amount of cultivated land affected and of methods of reducing salt concentration in affected areas.
- (c) A study of the economics of liming acid soils. The objective would be to develop programs and practices that make liming more attractive to farmers.
- (d) Intensified research on conservation tillage systems so as to develop practices which are acceptable to farmers and which are, at the same time, effective in maintaining soil organic matter and reducing soil loss by wind and water erosion.
- (e) An intensive investigation of agricultural productivity with respect to the influence of technological developments since 1950. This study should not only address the effect of technology on crop production but also on livestock production and food processing.

ASSEMBLIES OF THE ENVIRONMENT COUNCILS OF CANADA

Locations, sponsors, and main agenda topics.

1975, Ottawa, Ontario, Canadian Environmental Advisory Council

- 1) Land Use Planning and Management
- 2) Public Participation in Government Decision-Making
- 3) Communication
- 4) Environmental Education
- 5) The Urban Environment
- 6) Environmental Quality Indices
- 7) Population and its Distribution as an Environmental Problem

1976 - No assembly held

1977, Fort San, Saskatchewan, Saskatchewan Environmental Advisory Council

- 1) Land Use Issues Facing Canadians
- 2) Nuclear Development and the Environment
- 3) Environmental Impact Assessment Policy
- 4) Role of Public Involvement in Environmental Planning and Policy

1978, Brudenell, Prince Edward Island, Prince Edward Island Environmental Advisory Council

- 1) P.E.I. Institute of Man and Resources on Alternative Renewable Resources
- 2) Issues and Concerns of Participating Councils with respect to Alternative Renewable Resources
- 3) An Overview Presentation on Land Use
- 4) Environmental Impact Assessment
- 5) Environmental Aspects of Agriculture
- 6) Toxic Chemicals
- 7) Public Participation

1979, Hecla Island, Manitoba, Manitoba Environmental Council

- 1) Federal Strategy with respect to Hazardous Materials
- 2) The Effects on Health from Hazardous Materials
- 3) Pesticides in Water
- 4) Disposal of Hazardous Wastes
- 5) Legal and Political Implications of the Use of Hazardous Materials
- 6) Provincial Implementation and Action on the use of Hazardous Materials
- 7) Economic and Environmental Factors For and Against Hydro-Electric Schemes
- 8) Overview of Interprovincial Power Grids and Environmental Consequences
- 9) Effects of Hydro Development on Rivers

1980, St. Andrews, New Brunswick, Environmental Council of New Brunswick

- 1) Land Use Practices
- 2) Shore Zone Management
- 3) Long Range Transport of Air Pollution
- 4) The Environmental Impact and Implications of the Proposed Pittston Refinery at Easport, Marine

1981, Banff, Alberta, Environment Council of Alberta

- 1) Global 2000, The Canadian Perspective
- 2) Incremental Environmental Disturbance
- 3) Security of the Agricultural Land Base
- 4) Role of the Public in Government Decision Making on Environmental Matters
- 5) Ecological Reserves
- 6) A Compendium on Provincial Approaches to Environmental Legislation and Regulation

1982, Digby, Nova Scotia, Nova Scotia Environmental Control Council

- 1) Surface Mining in Nova Scotia and Environmental Issues
- 2) Environmental Impacts of Renewable Energy Sources
- 3) Environmental Education
- 4) Global 2000 Panel Discussion

1983, Ottawa, Ontario, Canadian Environmental Advisory Council

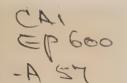
- 1) The Public Role in Setting and Enforcing Environmental Standards
- 2) Role of Environmental Councils

1984 - No Assembly held











1985-86 1986-87 Canadian

Environmental

Advisory

Council

Review of Activities





Canadian

Environmental

Advisory

Council

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary
Canadian Environmental Advisory Council
c/o Environment Canada
Ottawa, Canada
K1A 0H3

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council (CEAC) is a body representing a cross section of Canadians who are knowledgeable and concerned about the environment. It operates in a confidential advisory capacity to the federal Minister of the Environment. It provides the Minister with an alternative to the advice provided by the Department of the Environment (Environment Canada) and other federal agencies, and to the advice of specific interest groups. Council's public role, in terms of activities such as the publishing of reports, is therefore secondary to its primary function of providing advice to the Minister of the Environment.

canadien de l'environnement

Ottawa, Canada K1A 0H3

Minister of the Environment Ottawa. Canada

Dear Minister:

As I conclude almost a decade of service to you and to five of your predecessors, it seems an appropriate time for reflection on the course of environmental events during that period.

In an environmental context, "It was the best of times, it was the worst of times---."

It was the best of times mainly because of the steadily increasing environmental interest and concern on the part of the Canadian public. This brought about a strengthened resolve to act -- to protect the environment.

It was perhaps the worst of times because our political and bureaucratic processes proved unequal to the task. This criticism should be tempered by noting that during that decade we only began to understand the complexity of the environmental problems we faced.

Throughout that decade much of the apparent progress which was made in resolving environmental problems was simply a matter of "react and cure". Fortunately, there is growing acceptance of the need to understand the environment, to anticipate the adverse effects of human actions, and to avoid creating the problems. An examination of this Review of Activities illustrates the shift in emphasis: from an examination of enforcement policy, to scrutiny of the environmental implications of trade, and to analysis of the linkages between the environment and the economy.

There is, I believe, much reason for optimism. I base this optimism on a number of reasons including: improved environmental legislation, steadily increasing environmental awareness on the part of industry, continued and growing environmental interest by the media, and, notably, the continuing steady pressure by that relatively small group of Canadians who are known as "environmentalists".

I include you and your predecessors in the latter category. Each minister I have served has, in his own way, been concerned and dedicated to a better environment for future generations of Canadians.

Through this letter I want to thank you and the other ministers I have served for your support and encouragement. I also want to acknowledge the support and dedication of members and staff of the Council who helped to make my years on the Council an interesting and rewarding experience.

Yours sincerely

Tom Beck

Tom Beck. Chairman

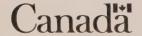




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COUNCIL OPERATIONS

Membership

Membership on the Council ranged between 8 and 10 during the period covered by this Review, April 1, 1985 to March 31, 1987. This was well below the maximum of 16 provided for in the Council's terms of reference. The reduced membership was due to a number of circumstances including funding constraints and the need to delay selection of potential new members pending decisions on the future role of the Council. Despite the limited membership, the Council endeavoured to maintain representation from the various regions of the country, from different sectors of society, and from a variety of fields of expertise related to current issues.

The end of the period covered by this report also marked the end of almost nine years of service to the Council by the Chairman, Mr. Tom Beck. He was first appointed to the Council in July 1978, later served as a vice-chairperson, and during the past five years as Chairman. In recognition of his major contribution over the years, the Minister of the Environment asked Mr. Beck to continue an association with the Council as Chairman Emeritus.

After more than a year in which the two positions were vacant, two new vice-chairpersons were appointed in January 1986: Dr. Shirley A.M. Conover of Halifax, and Dr. J.Stan Rowe of Saskatoon. Both had already served as members.

The following members completed their terms during 1985-86 and 1986-87:

Mr. B.A. Hubert
President, Boreal Ecology Services Ltd.
Yellowknife, Northwest Territories

Mr. Monte Hummel Executive Director, World Wildlife Fund (Canada) Toronto, Ontario

M^{me} L.B. Lepage Fédération des associations pour la protection de l'environnement des lacs (FAPEL) Montreal, Quebec

Dr. D. Mackay Professor, University of Toronto Toronto, Ontario

The following new members were appointed during this period:

Mr. M. Coolican Director, Public Affairs International Halifax, Nova Scotia Dr. Robert Page Professor, Trent University Peterborough, Ontario

Mrs. Diane Griffin
Executive Director, Island Nature Trust
Charlottetown, Prince Edward Island

A complete list of members at the end of 1986-87 appears in this Review as Annex A.

Meetings

Perhaps the most significant element of the Council's meeting schedule in 1985-86 was the initiation of workshops involving former members of the Council (the ''alumni''). The Council had felt for some time that former members could make a valuable contribution to discussion of current issues. They were called on for two of the three workshops — the Nielsen Task Force review of environment programs, and the Environmental Implications of Trade. The results encouraged the Council to plan on future participation by the alumni in special activities such as workshops.

There were six full meetings of the Council during 1985-86 including one meeting held in Quebec City prior to the 1985 Assembly of Environment Councils of Canada, a conference of the federal and provincial councils. There were only three formal Executive Committee meetings held during the year, although the Executive met informally prior to two of the workshops. The infrequency of Executive meetings was a result of delays in appointing vice-chairpersons.

There was a heavy meeting schedule in 1986-87, reflecting a surge in the Council's activities. There were six meetings of the full Council, with three held in Ottawa. The April meeting was based in Toronto and included a tour of toxic chemical sites in the Niagara Falls area. The August meeting was held in Charlottetown and provided an opportunity for a full-day meeting with the Minister. The September meeting was held in Edmonton prior to the 1986 Assembly of Environment Councils.

The Council organized one major workshop during the year to review the proposed Environmental Protection Act. The Council again drew on the knowledge and experience of its alumni in addition to that of current members.

The Executive Committee of the Council met seven times during 1986-87. The Executive and members continued to make good use of telephone conference calls to supplement formal meetings.

Publications

The primary role of the Council is to provide advice to the Minister in oral or written form. Only a few of its activities result in printed reports. The reports generally deal with major current issues or with fundamental concerns, and are intended to inform and educate.

Because of limited resources, the Council had accumulated a backlog of unprinted reports. The backlog was eliminated by the end of 1985-86; however, the increased level of activity by the Council and the priority given to publishing reports on current issues resulted in delays by 1986-87 in preparing and publishing the annual reviews of activities.

The Council published the following six reports during this two-year period:

— Examining Environment-Economy Linkages, by R.A. Knowles

This is the report of a study commissioned by the Council in an effort to explore and document the relationships between environmental quality and economic activity.

- Freer Trade and the Environment

The results of a workshop held in January 1986, and subsequent discussions within the Council, are summarized in this document.

— Enforcement Practices of Environment Canada, by Dr. Lorne Giroux

A preliminary assessment of enforcement policy and practice was prepared by Dr. Giroux in consultation with other members of the Council. It was prepared in June 1985 in response to a request by the Minister, and

published in January 1987 as a reference for discussions on the proposed Environmental Protection Act.

- Review of the Proposed Environmental Protection Act In response to a request by the Minister, the Council undertook a review of the draft Act. This document presents the results of a workshop and subsequent discussions within the Council. It includes background papers that were prepared for the workshop.
- Review of Activities 1983-84
- Review of Activities 1984-85

A complete list of the Council's publications to date appears in this Review as Annex B.

Staff

The Council's office support continued to be limited to two full-time staff despite management studies recommending increases. The staff operated in support of the members by organizing meetings and workshops, researching and gathering information on subjects selected for review by the Council, preparing and editing reports, managing contracts, and performing other administrative responsibilities.

The four workshops held during this period created a major additional workload for the staff that was partly offset by the use of contract services. The other major project undertaken by the staff during the period was the preparation and publication of the six reports mentioned above. The staff also assisted the Quebec environment council with the preparation of a report on the Ninth Assembly of Environment Councils of Canada.

COUNCIL STUDIES AND REVIEWS

The Council undertook a variety of activities in the 24-month period from April 1, 1985 to March 31, 1987, some at the request of the Minister and others on the initiative of the Council. This section of the Review is devoted to summaries of activities that were particularly significant and/or that required a considerable amount of the Council's time. Activities that were of a lower priority or to which less time was devoted are described briefly under "Other". A number of topics that appeared on the Council's agenda are not reported because they did not require specific action.

While the following activities are described under specific headings, each was not considered by the Council in isolation from the others. Cross connections between topics are mentioned in a few cases. They illustrate one of the Council's characteristics: an independent, multi-disciplinary approach to all environmental issues.

Toxic Substances

The threat of toxic substances to the environment and to human health was one of the main focal points for Council activity during this two-year period. In previous years the Council had studied particular aspects of the problem, such as pesticide control and lead in gasoline. The studies during 1985-86 and 1986-87 addressed toxic chemical clean-up from dumpsites, and control over the use and disposal of all toxic substances.

A request by the Minister for advice on an appropriate course of action for the clean-up of toxic dumpsites prompted the Council's initial examination. The Council proposed a pilot project approach — concentration of effort in one geographic area (a river basin or ecosystem) in order to develop and fine-tune techniques and institutional approaches that would be effective in cleaning up existing toxic chemical threats, and that would eliminate further releases. The clean-up and rehabilitation would require a cooperative effort by industry, provincial agencies, municipalities, public interest groups, foundations, labour unions, educational institutions as well as federal agencies.

A one-day field trip in April 1986 to the Niagara area expanded the Council's understanding of the problem and deepened its concern. The tour included briefings by regional environment officials, local environmentalists, and students from the Institute of Environmental Studies at the University of Toronto. Members visited four chemical dumpsites, including Love Canal where houses sat abandoned on the edge of the old toxic dumpsite, and viewed chemicals seeping from the rock face in the Niagara gorge into the Niagara River. The Council warned that an earth-quake or landslide could release tons of toxic chemicals from the dumps and result in a "Canadian Chernobyl"— a national and international long-term ecological and human health disaster affecting all downstream portions of the Great Lakes, St.

Lawrence River, and Gulf of St. Lawrence and beyond. The Council urged immediate action to: strengthen related scientific efforts; accelerate research into methods of waste immobilization, extraction and destruction; initiate small-scale pilot decontamination projects; and prepare a "disaster scenario" in case of a massive release from the dumpsites.

The profound impression created by the visit to the dumpsites is exemplified by the essay that has been included in this Review as Annex C. The essay, by one of the members of the Council, was prompted in part by the "toxic tour". It pleads for ethical treatment of the environment to avoid destruction of its life-supporting capability.

The Council's final effort on toxic substances during this period was made through its review of the proposed Environmental Protection Act. Toxic substances were a major focal point for that review. The Council's numerous recommendations appear in the report, *Review of the Proposed Environmental Protection Act*. The "Overview" from that document is included in this Review as Annex E.

Ministerial Task Force on Program Review

The Department of the Environment Self-Evaluation Study Team, which conducted a Review of the Minister of Environment Programs, was one of 19 teams appointed under the Ministerial Task Force on Program Review or "Nielsen Task Force". In mid-April 1985, the Chairman of the Study Team briefed the Council on its work and asked for the Council's views. Because of the Study Team's schedule, a presentation had to be made within two weeks.

The Council organized a one-day workshop in Toronto on April 30th which, for the first time, included former members of the Council — the ''alumni''. The report was presented two days later, within the Study Team's deadline. The Council's statement dealt with public attitudes, changing perceptions of the environment, the relationship between the economy and the environment, the federal role, the mandate of Environment Canada, future issues, and organization of the operations of Environment Canada. A copy of the statement appears in this Review as Annex D.

Members of the Council subsequently reviewed 9 of the 19 reports issued by the Nielsen Task Force and provided advice to the Minister on the recommendations for "improved program delivery". Council noted in particular a recommendation that the Council's role be expanded and that a major increase in resources be provided. The report of a follow-up study entitled, *Environmental Quality Strategic Review*, made no recommendation regarding CEAC, but proposed establishment of an independent "National Council on the Environment" to manage the environmental database and produce state of the environment reports.

Science Management

Environmental science has been one of the main focal points of the Council's interest, concern and activity since it was established in 1972. The concern reached a peak in late 1984 and early 1985 as a result of reductions to the scientific capacity of Environment Canada, particulary in the Canadian Wildlife Service.

in its statement to the Nielsen Task Force in May 1985, the Council identified scientific activities as one of three priorities for Environment Canada. That statement read in part:

"A re-statement and strengthening of the Department's scientific activities is necessary. These provide the knowledge base and competence to cope with critical environmental problems such as toxic chemicals and acid rain ...".

In commenting to the Minister and to senior officials, the Council noted that the other two priorities which it had identified could not be undertaken effectively without an adequate research program, and that "the scientific program provides the knowledge base which forms the foundation for any effort to protect, enhance or manage the quality of the environment".

The Council drew attention to a statement by the Inquiry on Federal Water Policy which found "... a more fundamental concern that water research is no longer regarded as important in its own right. Research seems to have been relegated to a technical support service, allowing the scientific base to erode".

Specific views expressed by the Council during its discussions included: the need for an independent review of environmental science within Environment Canada and nation-wide; the apparent selection of science as a target area for manpower reductions in the Department, creating an imbalance in relation to administration, and blocking entry of young scientists; the inadequate level of Environment Canada funding of environmental research in universities resulting in reduced contact and collaboration between the two groups of scientists; and the potential effect on Environment Canada's credibility with provincial governments, industry and the public of continued erosion of its scientific capability.

Enforcement Policy

The Council had been concerned for several years with what it perceived to be an inadequate level of enforcement of federal laws and regulations that were designed to protect the quality of the environment. A discussion with the Minister late in 1984 prompted the Council to undertake a preliminary assessment of enforcement policy and practices, and as requested, to identify specific inadequacies.

The assessment was completed early in 1985 and forwarded to the Minister. The Council noted that, on the basis of the preliminary assessment, the enforcement record of Environment Canada was "inconsistent, erratic and inadequate". The Council also recommended that a serious, in-depth review of enforcement policy be undertaken on an urgent basis. Total reliance on aggressive enforcement action was not recommended by the Council, but it noted that lack of enforcement, or inconsistency in enforcement, created doubt and uncertainty in the minds of those who were subject to regulation, and contributed to erosion of Environment Canada's credibility.

The Council had follow-up discussions with the Minister and with senior officials of the Department during the following year until the focus of discussion shifted to the proposed *Environmental Protection Act* and an accompanying proposed "compliance policy".

The Council's statement on *Enforcement Practices of Environ*ment Canada was published and released in January 1987 as background for discussion on the proposed *Environmental Protection Act*.

Proposed Environmental Protection Act

The Council's work on enforcement policy and practice evolved very quickly during the latter part of 1986-87 into a review of the proposed *Environmental Protection Act*. Initially, the Minister asked that the Council undertake a major program of public consultations on the Act. The Council prepared a detailed plan for the consultations but this had to be dropped when the resources needed for the consultations and for the Council's continued operation could not be provided.

A draft of the proposed *Environmental Protection Act* was tabled in the House of Commons for discussion purposes on December 18, 1986. In early January, interim funding was provided to the Council for the balance of 1986-87; the Council's operations were reactivated; reviews of the proposed Act from legal and scientific perspectives were commissioned; and plans made for a review of the Act through a workshop. Seven current members of the Council and nine alumni participated in the workshop held in Toronto February 10-12, 1987. The report of the Council's review was completed and published a month later, and released in time for use as a reference at the National Consultation Meeting held by Environment Canada on March 22-24.

The review by the Council resulted in more than 50 recommendations for changes. Detailed information on the changes is contained in the Council's report *Review of the Proposed Environmental Protection Act*. The "Overview" from that report appears in this Review as Annex E. The "Overview" mentions some of the main thrusts in the report. They include:

- strengthened authority for the Minister of the Environment particularly in relation to other departments;
- provision of a statutory base for the Environmental Assessment and Review Process;

- a "jump-start" for regulation of toxic chemicals to overcome inadequacies of the Environmental Contaminants Act.
- provision of adequate resources for implementation of the Act, particularly an increase in the number of trained chemists and ecotoxicologists; and
- increased provision for public involvement to ensure that there are equal opportunities for all sectors of Canadian society to participate in the regulatory process.

State of the Environment (SOE) Report

One of the Council's long-term objectives has been to ensure the establishment of state of environment reporting in Canada. Throughout a 10-year period the Council discussed, critiqued and promoted a series of initiatives, and published reviews of specific issues under a "State of the Canadian Environment" heading.

Early in 1985-86 the Council emphasized the importance it attached to SOE reporting. In its presentation to the Nielsen Task Force environment review team, it identified SOE reporting as one of the three main future tasks for Environment Canada. The Council's document stated:

"Public reporting on a regular basis regarding the state of the environment so that the private sector, and other departments and governments, organizations and institutions, and the general public are aware of changes and trends in the condition of their environment. A regular state of the environment report should be institutionalized as a required output of the department".

The first report on the state of the Canadian environment was completed at the end of the 1985-86 fiscal year by Environment Canada. Throughout the year, Council members worked with the authors of the report and the production team, reviewing and critiquing parts of the report. The Council also prepared the Foreword for the SOE report. The Foreword has been reproduced in this Review as Annex F.

Following release of the first SOE report in May 1986, the Council reviewed plans for follow-up action and held informal discussions with provincial councils to encourage provincial cooperation in data gathering for future reports. A resolution in support of SOE reporting was adopted at the 1986 Assembly of Environment Councils. The resolution urged that "all levels of government, public and industry should undertake joint development of an expanded and improved environmental database as a foundation for future national state of the environment reports".

Environment-Economy Linkages

In 1982 the Council had identified "environment-economy relationships" as a priority issue. At that time, the Council was concerned that economic problems might lead to short-term economic recovery efforts which would disregard environmental considerations and thus prejudice future environmental quality and long-term economic performance. This subject has continued as a Council priority since 1982 and has been reflected in a number of Council activities including workshops, conferences, and a submission to the Macdonald Commission (Royal Commission on the Economic Union and Development Prospects for Canada).

During the previous year (1984-85), the Council commissioned a study on linkages in order to better understand the relationships between environment quality and economic performance. The report of the study was revised during 1985-86 and published at year-end. The Foreword from *Examining Environment-Economy Linkages* appears in this Review as Annex G.

The study did not involve original research, but was an effort to describe in one document some of the main currents of thought regarding environment-economy relationships. The Council hoped that it would encourage other agencies and organizations to undertake further studies. The report acknowledged that there was a diversity of views on the subject, but urged that action "not await some far-off day when all differences of opinion have been resolved and mountains of specific data generated before we incorporate into policy-making some understanding of environment-economy relationships".

The efforts by the Council on this study proved to be a useful prelude to its involvement with the World Commission on Environment and Development. The Council provided copies of the final study as a background paper to the Commission. Members of the Council also participated in a Colloquium on the Environment in December 1985 that was sponsored by the Economic Council of Canada.

Environmental Implications of Trade

During the early stages of negotiations between Canada and the United States on a "free trade" or "comprehensive trade" agreement, the Council became concerned about the possible environmental implications. This interest stemmed from studies that explored the close linkages between economic performance and environmental quality. When it appeared that no other organization was examining the environmental aspects, the Council took the initiative and undertook a preliminary assessment through a workshop held in Toronto in January 1986. Participants included both current members and Council alumni. The discussions were

preceded by briefings by trade office representatives and the review of a discussion paper.

Following the initial workshop, the Council broadened its perspective to cover trade agreements in general. This was prompted by preparations for another round of multilateral negotiations under the General Agreement on Tariffs and Trade (GATT).

The results of the Council's preliminary assessment were published under the title *Freer Trade and the Environment* in June 1986. The Executive Summary from that report appears in this Review as Annex H.

The Council identified three principles that should govern all trade negotiations, and six potential direct effects on environmental protection and resource management in Canada. The report also included a recommended list of follow-up actions, including public consultation, and a variety of steps to gain a better understanding of the real or potential environmental effects.

As noted elsewhere in this Review, environment and trade was subsequently selected as a topic for discussion at the 1986 Assembly of Environment Councils of Canada, and several workshops were organized by other groups in both Canada and the United States. Because of its limited resources, the Council was unable to take other follow-up action.

World Commission on Environment and Development (WCED)

As noted under the heading "Environment-Economy Linkages", the Council had been endeavouring to better understand and promote the concept of relationships between environmental quality and economic performance. It therefore welcomed the establishment of the WCED or "Brundtland Commission" as a vehicle for increasing understanding and acceptance on a global basis of the fundamental connections between the environment and the economy. The Commission had been established as an independent body by the United Nations in 1983.

The Council met in December 1985 with the Secretary-General of the Commission for a briefing on the work of the WCED. The Council also provided the Commission with relevant information from its own studies and experience. Members participated in a workshop to develop a federal statement to the Commission, and two members of the Council made independent presentations to the WCED during the public hearings held in Canada in May 1986.

The Council regarded the work of the Commission as a major element in a sustained process of change in the way the environment is viewed, used and managed. The concern of the Council was focussed, in particular, on the traditional and growing compartmentalization of human affairs as evidenced in governments, universities, and international agencies, and the constraints this imposes on integrated management of the environment.

The Council received a draft of the Commission's report "Our Common Future" which was scheduled for release in April 1987. At the end of the period covered by this Review, the Council had met with representatives of international agencies and was discussing follow-up action in anticipation of the release of the Commission's report.

National Parks

The Council's continuing interest in national parks was highlighted during this period by several initiatives and by follow-up on previous studies and advice. Of particular significance were the National Parks Assembly, the National Marine Parks Policy, support for proposed new national parks including Ellesmere, South Moresby, Grasslands and Banks Island, and amendments to the *National Parks Act*.

Members of the Council participated in the Canadian Assembly on National Parks and Protected Areas held in Banff, Alberta in September 1985 as part of the National Parks Centennial. The Assembly culminated three years of work by interested groups and individuals at the local, regional and provincial levels.

The announcement of a National Marine Park Policy in September 1986 was welcomed by the Council. The Council had reviewed and commented on a draft of the policy three years earlier. One of its criticisms at that time was the absence of a complementary action plan or schedule for the establishment of marine parks. One step in this direction was taken with the announcement of a study to be undertaken on a proposed Saguenay National Marine Park. The Council had recommended establishment of a marine park in this area in 1983, partly as a means of protecting the endangered St. Lawrence beluga population.

The Council also applauded progress toward establishing a new national park on Ellesmere Island, and the Polar Bear Pass northern wildlife area. The Council had studied and made recommendations on both areas in previous years. The Council urged immediate action to complete negotiations on the proposed Grasslands National Park in Saskatchewan, noting that it represented the last opportunity to preserve a significant area of the original prairie that greeted the explorers and the western pioneers, and that areas of native grassland were being lost every year.

Near the end of this period amendments to the *National Parks Act* were tabled, and the Minister asked for the Council's advice on the amendments. A review of the amendments was started late in 1986-87.

Inquiry on Federal Water Policy

The Council's long-standing concerns about water management, in terms of both quality and supply, were noted in previous reviews. In particular, the Council had published a report in 1983, *Water Management in the Third World: Lessons for Canada''* by Peter F.M. McLoughlin. The Council had also participated in conferences on water issues, and had provided advice to the Minister on several occasions. The Council had maintained contact with the Inquiry on Federal Water Policy since it was established late in 1984 and had held one meeting with members of the Inquiry during 1984-85.

Action by the Council on this subject during the period covered by this Review followed release of the final report of the Inquiry, *Currents of Change*. Members of the Council reviewed the report and a number of the background papers commissioned by the Inquiry, and provided advice to the Minister including recommendations for follow-up action.

In the Council's view, one of the main deficiencies of the report was its nature as a "water resource" document rather than a study of water within the broad context of the environment. The Council recognized, however, that this weakness may have been the fault of the terms of reference set for the Inquiry.

The Council's Future Role and Resources

The future role of the Council and the adequacy of resources to support its operations became major issues during this period, particularly throughout 1986-87. In the past, the Council felt that it should not respond to public proposals for changes in its role because the initiative for changes in its basic role as an advisory body to the federal Minister of the Environment should come from the Minister.

Late in 1985-86, the impetus for an examination of a broader role for the Council was provided by the Minister who indicated a desire to examine an expanded role including a higher public profile. The need for action by the Council was reinforced by additional public proposals for changes in the Council's role and resourcing, or establishment of a new form of Council. These proposals came from the Inquiry on Federal Water Policy, a Niagara Institute project, the ENGO Environmental Task Force, and the reports of two study teams under the Nielsen Task Force (Ministerial Task Force on Program Review).

The Council commissioned a management study of its staff support to examine alternatives and assess resource needs. A review of this study by members, particularly the relationships between role and resources, and an informal survey of representatives of industry and public interest groups provided the basis for a day-long discussion with the Minister. The Council responded to that discussion with a proposal for

a broadening of the Council's role which focussed on public consultation, serving as a catalyst to generate public discussion of environmental issues, and developing consensus among a variety of interest groups. The Council noted that it could not maintain its present level of activity, much less undertake an expanded role, without additional resources. It proposed an increase in the number of members appointed to the Council, additional staff, and an increase in funding. The Council subsequently prepared a detailed budget, organizational plan, a draft statutory base, and a draft "memorandum of understanding" for negotiation with Environment Canada.

The Council received interim funding to complete the 1986-87 fiscal year. This covered the cost of the review of the proposed Environmental Protection Act, which represented a move toward a broadened public role. By year-end no progress had been made toward resolving the critical issue of future resources, and for the second time that year the Council was forced to suspend operations.

Other

Arctic Marine Conservation Strategy

Development of a comprehensive Arctic Marine Conservation Strategy for Canada was initiated by the Department of Fisheries and Oceans. It stemmed from the World Conservation Strategy and had been recommended by the Task Force on Northern Conservation. The Council recommended support by the Minister of the Environment and Environment Canada, particularly in connection with specific areas that required protection. The Council, through its Chairman, participated directly in development of the Strategy.

Policy and Procedures for Fish Habitat Management

The proposed policy was released by the Minister of Fisheries and Oceans for public comment early in 1985. The Council provided comments through the Minister of the Environment. The main thrusts of the Council's comments were the need to recognize a variety of goals, not just fish habitat, and support for "a holistic and integrated approach to the aquatic environment and to the many interests involved in a given area".

Lead in Gasoline

The report of the Royal Society of Canada's Commission on Lead in the Environment was made public late in 1985. Members of the Council met with the Chairman of the Commission and with industry representatives to assess problems in removal of lead from gasoline. The Council supported recommendations for regulatory action and public education, but urged that steps be taken to remove the price

differential between leaded and unleaded gasoline. The Council also drew attention to detailed recommendations that it made in 1983.

Public Consultation

Members of the Council maintained contact throughout this period with members of public interest groups and representatives of other sectors, and participated in national public consultation meetings organized by Environment Canada. The Council also provided advice to the Minister, and particularly stressed the need for consultation on specific policies and issues, and for meeting with environmental non-government organizations (ENGOs) on a regional basis.

Northern Environmental Issues

The Council maintained its special interest in northern environmental concerns, although much of its involvement is reflected in other parts of this Review including National Parks and the Arctic Marine Conservation Strategy. The Council arranged two briefings on current northern environmental issues, and gave the Minister its views. In particular, Council urged that assessments be made of the environmental effects of the proposed North Warning System.

World Conservation Strategy

The Council continued its active support for implementation of the World Conservation Strategy. As noted elsewhere, the Council participated in development of the Arctic Marine Conservation Strategy, and in discussions on the development of provincial conservation strategies at the two assemblies of councils held during this period. The Council also advised on preparations for a major international conference held in Canada in May 1986 to promote implementation of the World Conservation Strategy. The Council was represented at the Conference.

Macdonald Commission

In previous years the Council had submitted a brief to the Royal Commission on the Economic Union and Development Prospects for Canada (Macdonald Commission), and had responded to the Commission's interim report *Challenges and Choices*. Representatives of the Council were briefed on the final report which was released in September 1985, and reviewed the parts of the report relevant to environmental quality. While the Council did not agree totally with the environmental content of the Commission's report, members noted the significance of including environmental concerns in the report of a major study which was oriented primarily towards the economy.

ASSEMBLIES OF ENVIRONMENT COUNCILS OF CANADA

Assemblies or "joint meetings" of the federal and provincial environment councils have been held on an annual basis since 1975, with the exception of 1976 and 1984. They have enabled the councils to exchange ideas, share common problems, learn from the experience of others, and build support for shared ideas and concepts. A list of the assemblies held to date and the major topics discussed at each, appeared in the Review of Activities 1984-85.

Two assemblies were held in the period under review. A brief description follows, along with the "recommendations" or "resolutions" passed at each. Because of the informal nature of the assemblies, resolutions are accepted with the understanding that each council will take action on the resolutions according to its own views and circumstances.

1985 Assembly

This meeting was hosted by the Conseil consultatif de l'environnement du Québec in Quebec City. In addition to Québec, participants included Nova Scotia, New Brunswick, Ontario, Manitoba and Alberta. The Canadian Environmental Advisory Council was represented by six members. The main themes for presentations, workshops and plenary discussions were: The St. Lawrence River and the Environment, and Developing a Provincial Conservation Strategy.

The following recommendations were accepted at the conclusion of the Assembly:

"1. Whereas the St. Lawrence River system typifies several major river systems which are major sources of economic development for several provinces of Canada;

Whereas the St. Lawrence River is representative of many diversified natural ecosystems essential to maintain life;

Whereas the St. Lawrence basin constitutes a national heritage attesting to the art of man and to nature;

Whereas the St. Lawrence River system has been subjected to long-term pollution and degradation;

Therefore, this Conference recommends:

That provincial governments, and the Government of Canada through its participation in the International Joint Commission, consider additional appropriate measures to reduce pollution of major watersheds and waterways to improve the quality of life, and the opportunities for sustained economic development, through the provision of adequate high quality water.

"2. Insofar as provincial conservation strategies are concerned, it is the view of the Environment Councils of Canada, meeting in their ninth conference at Quebec City, that:

Whereas the development of provincial conservation strategies within the framework of national and the world conservation strategies have the potential to:

- a) Identify those elements that are critical to the preservation of a quality environment;
- b) Develop a consensus among both conservationists and developers on the values that they hold in common;
- c) Identify those provincial environmental concerns that can only be solved by action on a scale larger than that encompassed by the provincial government unit, e.g. national, international or supranational.

Therefore be it resolved that provincial governments be urged to develop provincial conservation strategies, with the assistance of provincial environmental advisory councils including essential consultation with the public necessary for the development of a successful provincial conservation strategy."

1986 Assembly

This meeting was hosted in Edmonton by the Environment Council of Alberta. Participants included Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Alberta and the Northwest Territories. Eight members of the Canadian Environmental Advisory Council attended. The main themes of the Assembly were: Environmental Implications of Trade, and Progress of Conservation Strategies,. The latter featured a panel discussion during which industry, provincial, regional and local, and non-government organization perspectives were presented.

The following resolutions were developed through workshops and the plenary session and accepted for appropriate follow-up action by individual councils:

"1. Considering that the negotiations on free trade with the U.S. are ongoing:

Considering that the Macdonald Commission, following an extensive public consultation, chose to underline the possible effects on our environment following a negotiated free trade agreement;

Considering that the quality of our environment must be protected and enhanced;

Considering that the present elements being discussed at the negotiating table could have important effects on the quality of the North American environment;

be it resolved:

That the Joint Assembly of the Canadian Environmental Advisory Councils, during their 10th Joint Assembly held in Edmonton on the 25th of September 1986, recommend to the federal and respective provincial ministers that the necessary provision be secured through the present negotiations in order to ensure: (1) that the quality of our environment be considered in all negotiations; (2) that the Canadian contingent be assured of an adequate representation of individuals who have a direct interest in the preservation and protection of our environment in a manner which is consistent with our Canadian lifestyle.'

"2. Background

As stated in the foreword to the first Canadian State of the Environment Report: The environment is the foundation on which we base all economic and social activity — in fact, it is the base of life itself . . . systematic, comprehensive, regular reporting on the state of the environment is no less indispensable to the country than a statement of national

accounts or the cost of living index; it is as essential to individual Canadians as a bank balance statement or a regular medical examination. All provide a basis for assessing our condition as a nation and as individuals, and for planning our future.

Resolution

This Assembly therefore commends the federal Minister of the Environment and his department for production of Canada's first nationwide state of the environment report; urges that such reports be prepared and published on a regular basis; and recommends that all levels of government, public, and industry undertake joint development of an expanded and improved environmental database as the foundation for future national state of the environment reports."

"3. "This conference commends the Environment Council of Alberta for its efforts to develop a Provincial Conservation Strategy through a process of public participation, and recommends that individual councils, within their respective jurisdictions and within the terms of their respective mandates, initiate and/or support efforts to involve the public in development of overall strategies and solutions for specific local and regional environmental problems utilizing the principles and concepts set forth in the World Conservation Strategy."

MEMBERSHIP Canadian Environmental Advisory Council

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Dr. Shirley A.M. Conover Dalhousie University Halifax, Nova Scotia Vice-chairperson

Dr. J. Stan Rowe University of Saskatchewan Saskatoon, Saskatchewan Vice-chairperson

Mr. M. Coolican Public Affairs International Halifax, Nova Scotia Mr. John L. Fryer National Union of Provincial Government Employees Ottawa, Ontario

Dr. J.A.F. Gardner University of British Columbia Vancouver, British Columbia

Dr. Lorne Giroux University of Laval Ste-Foy, Quebec

Mrs. Diane Griffin Island Nature Trust Charlottetown, Prince Edward Island

Dr. Robert Page Trent University Peterborough, Ontario

Staff

Mr. Max McConnell, Executive Director

Dr. E. Fred Roots, Science Advisor

Mrs. Veena Halliwell, Project Coordinator

LIST OF PUBLICATIONS

Reports

- (1) An Environmental Impact Assessment Process for Canada, February 1974 (out of print).
- (2) An Environmental Ethic its Formulation and Implications, by N.H. Morse, January 1975 (out of print).
- (3) Harmony and Disorder in the Canadian Environment, by P. Dansereau, 1975 (English out of print).
- (4) Towards an Environmental Ethic, by D.A. Chant, March 1977 (out of print).
- (5) Environmental Aspects of Nuclear Power Development in Canada, by H. E. Duckworth, H. W. Porter and J. S. Rogers, 1977 (out of print).
- (6) Report of the Second Joint Meeting of Environmental Advisory Councils, May 1977, Fort San, Saskatchewan. (Produced in collaboration with the Saskatchewan Environmental Advisory Council, March 1978).
- (7) The Management of Estuarine Resources in Canada, by I. K. Fox and J. P. Nowlan, March 1978.
- (8) Report of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council, May 1978.
- (9) Ecotoxicity: Responsibilities and Opportunities by R. H. Hall and D. A. Chant, August 1979.
- (10) Report of a meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Published in 1981.
- (11) A New Approach to Pest Control in Canada by R. H. Hall, July 1981.
- (12) Wildlife Conservation Issues in Northern Canada, by I. McTaggart-Cowan, October 1981.
- (13) Water Management Problems in the Third World: Lessons for Canada, by P. F. M McLoughlin, March 1983.
- (14) Terms of Reference, March 1984.
- (15) Report of the Eighth Assembly of Environment Councils of Canada, May 1984.
- (16) Selected Papers from Assemblies of the Environment Councils of Canada, 1975-1980, March 1985.
- (17) Sustainability of Farmed Lands: Current Trends and Thinking, by C. F. Bentley and L. A. Leskiw, March 1985.
- (18) Examining Environment-Economy Linkages, by R. A. Knowles, 1986.
- (19) Freer Trade and the Environment, May 1986.
- (20) Enforcement Practices of Environment Canada, by L. Giroux, June 1985. Published January 1987.
- (21) Review of the Proposed Environmental Protection Act, March 1987.

Annual Reports

Annual Review 1973-1974. Part A — Activities. Part B — Problems and Priorities in the Canadian Environment.

Annual Review 1975. Part A — Activities. Part B — Significant Environmental Problems.

Annual Review 1976. Part A — Activities. Part B — The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A — Activities. Part B — The State of the Environment.

Annual Review 1979-1980. (Includes: A Decade of Environmental Concern: Retrospect and Prospect; Environmental Assessment and Review Process: Observations and Recommendations).

Review of Activities 1981-1982; 1982-1983. (Includes: A Perspective on the Canadian Environmental Advisory Council; Resolutions of the 1981 Assembly of Environment Councils of Canada).

Review of Activities 1983-1984. (Includes: A Submission to the Royal Commission on the Economic Union and Development Prospects for Canada; Acceptable Risk; Assessing Proposals for a Canadian Pesticides Advisory Board; Completion of the National Park System in the North; The Key to the Future).

Review of Activities 1984-1985. (Includes: Guidelines on Conflict of Interest Situations; The Central Council for Environmental Protection in the Netherlands; Canadian Agricultural Land Base: Quantity and Quality).

Note: CEAC's primary role is to advise the Minister, not to report to the public.

The above listing of publications reflects only a portion of the information generated.

ETHICS AND ENVIRONMENT

by J. Stan Rowe, Ph.D.
Professor Emeritus
University of Saskatchewan

I have taken the "Toxic Tour", visiting the USA Niagara's Love Canal, Hyde Park, and other infamous dumps that are threatening the water supply and health of millions.

To see the ghost community with its boarded-up houses, schools, churches, is to get the eery feeling of what the whole world will be like when we have poisoned it to death. The only way that the human race can do itself in, finally and completely, is by destroying the life-giving and life-supporting environment. To treat it ethically is perhaps more important therefore than treating animals or even other humans ethically. Ethics and Environment is no longer for academic discussion only; it is a subject of intense practical importance.

Ethics is a branch of philosophy, which may seem to put it outside the daily concerns of average people with ecological interests. But two points bring it down to earth. The first, the insight of Cathy Starrs of Environment Canada who has spent many years attempting to get philosophers and lay-people thinking about environmental issues, is that the common denominator of practical ethics is the idea of caring and of responsibility in actions. To be ethical toward the environment is to care for and take responsibility for it.

The second point is that ecology urges on philosophy and ethics—a radical idea all but lacking in the heavy thinkers from Plato to Nietsche; namely, that the environment has supreme values. The planet earth swinging around the sun is at least as important as the people catching a ride on it. The environment merits ethical concern.

But, does not everyone accept that environment is important today? Only because its deterioration causes us discomfort. The focus in our society is determinedly people-centred, anthropocentric. Most of us are humanists through and through. We are also utilitarians, seeking the greatest good for the greatest number by drawing on the planetary resource bank as if it had unlimited assets.

Thoreau was one of a small minority who constantly battled against society's deeply ingrained utilitarianism. "The world," he said, "is more beautiful than it is useful", which means that admi-

ration for it should be set above what we can get out of it — just as one ought to marvel at Canada's wildernesses and National Parks before sitting down with pencil and paper to figure out how to make them pay for themselves.

Ecophilosophers in the Thoreau tradition are appearing again today, attempting to reorganize human knowledge and reorient human attitudes toward the new reality that has been glimpsed from outer space — the blue cloud-swathed earth-orb, a luminous cell, a living world or Gaia in James Lovelock's description.

A formidable obstacle to the new ecophilosophy (and also to a science of ecosystems) is pointed out by Marshall McLuhan's insight that environment is hard to conceive. "We don't know who discovered water," he remarked by way of parable, "but we're fairly certain it wasn't a fish."

Unaware of our life-sustaining milieu, not seeing environment as the earth-skin that encapsulates all life including the human race, we proceed blithely along a path marked "Progress" that seemed only right and proper when it was first blazed four or five centuries ago. Descartes, Bacon, Galileo, Kepler — heroes who sparked the Age of Enlightenment — bequeathed to us the attitudes and the mental tools that have brought us to where we are today. Science as both technique and knowledge is part of the environmental problem.

Science is a cultural pursuit that has sprung from a certain western tradition, a certain way of viewing the universe. Therefore science, like the philosophers whose ideas perfected it, is profoundly non-ecological in its axioms, assumptions, fundamental premises. For science is far more than a method of solving problems. It begins with a particular view of how the world is, of what is important to know about it, and of what to do with it. At its roots, science accepts the idea of a dead world whose realities are material and mechanical, a world meant to be turned to human uses. Science is ethically oriented to people, not to the environment. Hence the technology that science spins off is by and large environmentally destructive.

Governments support science and scientists because of the public belief that science and technology will make life better, stimulate

Note: This article by one of the Council's vice-chairpersons was the basis for a lecture delivered at the University of Guelph, and subsequently appeared in the *Canadian Veterinary Journal*, September, 1986.

the economy, provide jobs. Indeed, science and technology have done just that. But the price of material benefits is environmental deterioration. As the problems in air, water, soil, and biota build up, questions arise clearly: Have we taken too narrow a view of what is important, and of what merits ethical concern? Is our traditional anthropocentric world-view realistic? Have we misconceived the world and ourselves, and developed a way of knowledge, a science, that is wrong for today's problems?

Ecologist Joseph Meeker, in his book *The Comedy of Survival* comments: "For four centuries science has been regarded as an instrument for manipulating Nature, rather than as a means by which humanity may participate more knowingly in Nature's processes."

Sometimes when frustrated and angry because of someone's unacceptable behaviour, we ask indignantly: Just who do your think you are? That question should be asked of all of us all the time, and not in anger, for it is the most profound of questions. Who we think we are determines how we act, and what things we will act responsibly and ethically toward. Every society or culture shares beliefs or paradigms that answer that question.

The environmental crisis has challenged the traditional paradigm that says each of us is an autonomous individual, a center of importance, a spark of life in a largely "abiotic" world, outside Nature and destined to shape Nature to whatever forms are desired. Riley Dunlop in the *Bulletin of Atomic Scientists* (November 1983) calls this the "Exemptionalist Paradigm". It assumes too that humanity's exceptional characteristics — especially science, technology, ingenuity — exempt the human race from all the ecological limits that constrain other species. In contrast, the "Ecological Paradigm" places people as parts of a larger living system. Therefore they are not exempted from ecological constraints, and they must creatively seek a gentler science and technology to develop a symbiotic relationship with the world environment. Valuing the latter will make of it an ethical object.

Last year, the Law Reform Commission produced a Working Paper entitled *Crimes Against the Environment*. That bespeaks

a new ethical attitude. We should be outraged when the ecosphere, the world ecosystem, is abused.

But the objective of ethics today is still humanity and only humanity. Practical or applied ethics at the universities is mostly concerned with people problems — in Law, Medicine, Commerce. How reassuring to hear that at Guelph, in Veterinary Medicine, the focus of ethical interest has been broadened, for the Golden Rule does not speak directly to disasters such as Love Canal.

We need to raise our sights and make the world an ethical object, a higher level of integration than people and other organisms that apparently were produced through some generative miracle by the world.

It is rare to hear political leaders preaching this message, but here are the words of the Prime Minister of Japan as he spoke to the Canadian Parliament in January of this year in Ottawa:

"We must rid ourselves of arrogance toward Mother Nature. Japan's traditional religion teaches that Nature is the mother of all creatures, and all living things are essentially brothers and sisters in the natural universe. Such philosophy is not exclusively that of the Orient but can also be found on other continents. Needless to say, I am not suggesting that religions unique to different peoples should be united under one great Oriental theology. Instead, I submit that it is perhaps high time for us to redirect our thinking towards the basic feelings of awe, intimacy, respect and love towards Nature which mankind has had over the millennia, and to appreciate afresh what they mean to us today. When such reorientation has started on a global scale, what I call the grand enterprise of establishing a new global ethic will have begun."

I personally believe that Prime Minister Yasuhiro Nakasone has got it right. Without extending ethical concerns beyond humanity to the world, without developing a strong environmental ethic, we are unlikely to survive.

A VIEW TOWARDS 2005 — FUTURE ENVIRONMENTAL TRENDS AND ISSUES

Summary Statement

- The environment is a political imperative.
- The environment is central to a healthy economy.
- Some if not all environmental problems are going to get a lot worse. There are, no doubt, more unpleasant surprises coming.
- The structure and direction of the Department of the Environment is a key issue.

Public Attitudes

 Environmental concerns are no longer considered a "fad" of the 1970's.

Environmental concerns continue to rank as a high priority with the public.

- 86% of Canadians favour maintaining environmental laws rather than relaxing them to achieve economic growth.
- 83% of Canadians favour protecting the environment as opposed to relaxing laws which might enable the cost of environmental protection, as reflected in costs of goods and services, to be reduced.
- 64% of Canadians favour doing more to protect the environment even if it means that some jobs must be lost in the process.
- In the current Ontario election, for the first time environmental concerns have become one of the main election issues.
- Given the continuing high level of public concern about the environment, particularly health-related aspects, governments need to be aware of the potential for a massive public outcry if some new and widespread threat is uncovered, e.g. a proven link between an environmental contaminant(s) and cancer.

Perceptions of the Environment

Increasing recognition is being given to the intimate and complex relationship between human activities and the

environment. The following sketches illustrate a few of the perceptions which are, in part, historical, but which are all current to some extent today.

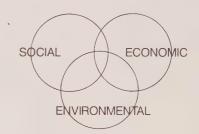
1. The traditional view of unrelated social and economic spheres of activity, and no conscious consideration of environment.



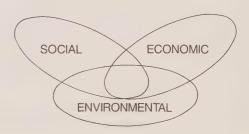
2. Recognition of environmental factors as a fringe consideration.



3. Perception of areas of interplay between the three spheres.



4. The perception, gradually gaining acceptance now, of the environment as the support system for, and an integral part of social and economic activity.



Note: Notes from a workshop organized by the Canadian Environmental Advisory Council, April 30, 1985 and submitted, at its request, to the DOE Study Team of the Ministerial Task Force on Program Review or "Nielsen Task Force."

The Issues of the Relationship Between the Economy and the Environment

- Economic measurements related to the environment need to be applied over the long term; the conventional economic approach of annual balance sheets does not properly reflect environmental costs. Degrading the environment amounts to "short-term gain for long-term pain". For example, the costs of clean-up of U.S. priority toxic dumps is estimated at \$200 billion, a cost which will have to be paid by future taxpayers.
- Concern is currently being expressed, and rightly so, about the size of, and the cost of servicing the budgetary national debt. The above is an example of another form of national debt the "national environmental debt". Lack of management and inadequate safeguards have created in Canada a national environmental debt in the form of degraded soils and forests, reduced stocks of fish and wildlife, polluted lakes, rivers and air. If the total cost of restoring the environment to a healthy, productive state were tallied, it would far surpass the size of the budgetary national debt. Yet the "national environmental debt" is also a cost to future taxpayers a cost in restoration, in health effects, and in reduced economic performance.
- Natural resources will remain a keystone in the Canadian economy in a highly competitive global economy. Renewable resources must be exploited in a sustainable fashion, and non-renewable resources in a rational way. Environmental planning and management must be an integral part of this exploitation so that the overall costs, both financial and environmental, are minimized and costly or irretrievable exploitation blunders are avoided. It is important not to foreclose opportunities in fisheries, agriculture, forestry, tourism, foreign exchange and investment, etc., by failures in environmental planning.
- As one example of environment-economy linkages, using a Statistics Canada study, the World Wildlife Fund estimates that over 80% of Canadians participate in wildlife-related activities involving expenditure of \$15-20 billion per year, and providing 350,000 jobs.
- Social-environmental linkages are of equal importance although cost figures are unavailable. They include, in particular, health aspects and the contribution to social stability provided by a high quality environment.

The Issues Pertaining to the Federal Role

 The public expects the federal government to play a leadership role in environmental matters. It is usually unaware of which level of government is responsible for specific areas or

- issues, and is frustrated when it appears that issues fall into the cracks between governments. A good recent example is the Kenora PCB spill which was perceived by the public in other provinces to be a national responsibility.
- Environmental problems and issues occur, on a continuous not scales from municipal, provincial, and federal, through international. The federal level of government is responsible for dealing with issues of national significance. In addition, it has responsibilities to carry its country's interests and contributions to the international forum, and to reinforce the roles and responsibilities of provincial, territorial and municipal governments.
- The current Canadian legalistic approach, defining federal responsibilities just on the basis of jurisdiction, appears inadequate in the environmental field. Political or regulatory action tends to be fragmented in relation to ecological processes which transcend jurisdictional boundaries.
- The federal government should play a leadership role in ensuring that all environmental problems or potential problems are addressed by whatever agency of government(s) or by the private sector.
- Cost effectiveness should be an important factor in assessing the federal role. It may be more beneficial for the federal government to carry out certain programs with national applicability rather than to have each province or municipality independently trying to invent the same wheel. Program delivery does not necessarily have to be performed by the level of government which is legally responsible for the activity. A good example may be dry cleaning wastes contaminating local drinking water. This problem has to be corrected by each municipality, but research and guidance should be provided at the federal level as it is a national (and international) issue.

The Issue of the Mandate of the Department of the Environment within the Federal Role

- Because environmental, as well as social and economic concerns, are common to most, if not all, departments of the federal government, Environment Canada requires a stronger and more specific and directed mandate, preferably embodied in legislation.
- The purpose of the Department of the Environment/ Environment Canada is suggested to be:
 - "To maintain the quality of Canada's natural environment, including its renewable natural resources, as the foundation for sustainable economic and social well-being of Canadians."

- The function and role of the Department are implicit in this statement. The degree to which fragmentation presently exists stems from the lack of a clear mandate.
- The Department of the Environment requires a coherent, comprehensive legislated mandate. Historically, the Department was created by drawing together a fragmented collection of diverse programs and legislation, resulting in a lack of focus and an inability to act. Consideration should be given to the creation of a Canada Environment Act.
- As an alternative, a stronger legislative base could be provided by consolidating various pieces of existing legislation, including Section 33 of the *Fisheries Act*, under a "Canada Environment Act." This would have the disadvantage of being just an uncoordinated collection of legislative authorities.
- The Department of the Environment should play the central role in planning, management, and enforcement of all aspects of its mandate. Other departments with environmental interests should play an advisory role, not the reverse as is presently the case under the current legislated system.
- Environment Canada is the integrated mechanism for government as a whole to properly address environmental management regionally, nationally, and internationally.

Future Issues

Many if not most of the environmental issues which we will face by the year 2005 have already been identified, but they will increase in intensity and complexity, partly through cumulative effects, and will result in massive expressions of public concern. Examples include:

Toxic chemicals: As important as it now is, an exponential increase in the gravity of this issue is anticipated. The level of public concern can be expected to reach extreme proportions. Contaminants in food and drinking water as related to human health will be the most critical aspect, and could require the expenditure of hundreds of times the effort now spent by governments on environmental problems.

Acid rain: We have a reasonable understanding of what has to be done for control of acid rain, but it requires the will to act at all levels — individual, corporate, provincial, national and international. It is unlikely that there are any major surprises in store except possibly financial. There may be further discoveries related to clean-up techniques, restoration, and the indirect effects through soil and water on renewable resources and the associated food chains, and the direct and indirect effects on human health.

Nuclear winter/nuclear incidents: The long-term implications for all life forms on the planet as a result of any nuclear war are sufficiently well understood to give the avoidance of a

nuclear winter first priority among all issues with all governments. Related to this is the probability that in their lifetime Canadians will experience additional nuclear incidents which may create environmental damage of a less severe and much more limited nature. The capability to respond and, as possible, control and limit effects is an environmental issue. (The term ''nuclear incidents'' does not refer only to malfunctions at nuclear-powered generating plants. It includes, for example, the crash of the Cosmos satellite in the Northwest Territories. The perceived seriousness of that incident would probably have been a thousandfold greater if the radioactive debris had been scattered along the Trans-Canada Highway.)

Environmental health hazards: Current human environmental health programs stem from concerns related to food additives and pesticides. There is a growing level of public concern over a range of environmental health hazards, including toxic contaminants, and the possible synergistic effects of toxic chemicals in the environment, the food people eat, and the water they drink.

Soil degradation: Concern over degradation of both forestry and agricultural soils will continue to increase. The soils in some areas may become increasingly less capable of meeting the demands placed upon them, and of meeting our economic expectations.

Environmental planning: Dedication of effort toward improved environmental assessment procedures should be maintained, including provision for integration of processes from various jurisdictions, i.e. EARP, NEB, provincial, territorial, COPE, etc.

Environment alteration/habitat destruction: Further resource development, urbanization, and ongoing development of transportation, agricultural, forestry, and recreational resources will result in alteration to the present environment, including destruction of habitat that supports valued ecosystems and species. The national resolution of these competing needs for the same physical/ecological resources is an important issue.

Over-utilization of renewable resources: Over-utilization of renewable resources — forests, agricultural lands, fisheries, and hunted wildlife species — ultimately results in both ecological disruption and economic loss. For example, there are current predictions of the imminent (within 15 years) loss of the British Columbia forest industry, with consequent loss of 30,000 direct jobs, revenues, resulting social disruption and requirement for social programs, to name just a few of the interlocking consequences.

Potentially catastrophic results of new technologies: New developments in emerging technologies, notably genetic

engineering, have a potential for unexpected and uncontrollable results in terms of alteration of the living environment. These would create, either gradually or suddenly, new environmental issues.

Long-term trends: Long-term trends such as carbon dioxide build-up, change in local climatic patterns such as rainfall due to destruction of the forests, etc., are major international issues requiring Canadian involvement and recognition of our contribution to the problems. Eventually, cooperative international efforts will be mobilized in these areas, as we are now seeing with acid rain. The Canadian effort in acid rain serves as an example of our obligations and contributions to such issues.

There are many other issues which, on the surface, may not appear to be major environmental concerns at present but which, because of public attitudes and values, have the potential to become significant issues both politically and environmentally. Two examples can be drawn from the wildlife field: the decline in wildlife habitat which will limit the potential for wildlife-related activities by the 80% of Canadians who participate; and the campaign by the animal rights groups which can be expected to expand with continuing urbanization of the population, and whose effects may be felt from the local to the international level.

Organization of Operations of Environment Canada/Department of the Environment

(The following comments reflect perceived inadequacies in the past, and what appear to be requirements for effective performance in the future.)

- As a reflection of high public concern about environmental matters and increasing recognition of environmental-economicsocial interrelationships, environmental programs can be expected in the future to rank among the most important functions of government. The status of Environment Canada should reflect this.
- With or without a stronger legislative base, the Department needs a renewed and clear sense of purpose, direction and responsibility, and a sense of mission to provide assurance of continued will and spirit among the staff. The Department's responsibilities need to be clearly defined.

- The Department should be organized and tuned to respond quickly and effectively to new issues or variations of existing problems.
- The paramount role of the regional offices requires recognition. There are many responsibilities and programs that are delivered most effectively at the regional level. The regional offices should be supported and given clearer mandates to manage responsibilities appropriate to their locations and connections.
- In the future the Department will need new talents and new methods to achieve its objectives. This includes the ability to think and act in a strategic manner. Negotiating abilities need to be enhanced to more effectively influence other departments where jurisdictions overlap; to enter into cooperative negotiations with project proponents on the means of mitigating environment impacts and/or enhancing environmental quality; and the talents to negotiate environmental safeguards with project proponents so that a code of good environmental behaviour is gradually developed.
- Among new or enhanced programs or activities, three requirements stand out:
 - A re-statement and strengthening of the Department's scientific activities is necessary. These provide the knowledge base and competence to cope with critical environmental problems such as toxic chemicals and acid rain, and supply the basis for the fully professional influence, negotiation, and guidance referred to above.
 - Development of comprehensive "early warning systems" to detect and measure changes in the environment. This can take several forms, such as the reactivation of the departmental Advanced Concepts Centre, and the institution of "status and trends" programs that monitor key informative changes in the physical, chemical, and biological environments. Status and trends monitoring programs are especially important in the area of toxic contaminants.
 - Public reporting on a regular basis regarding the state of the environment so that the private sector, other departments and governments, organizations and institutions, and the general public are aware of changes and trends in the condition of their environment. A regular state of the environment report should be institutionalized as a required output of the Department.

REVIEW OF THE PROPOSED ENVIRONMENTAL PROTECTION ACT

OVERVIEW

The Canadian Environmental Advisory Council (CEAC) reviewed the proposed *Environmental Protection Act* at the request of the Minister of the Environment. That review brought forward more than 50 recommendations for changes in the proposed Act, and in the way the Act should be implemented and administered. They are described in Part I of this report and proposed amendments to the Act are consolidated in Part II. No attempt has therefore been made in this Overview to summarize the recommendations, but rather to briefly describe the context in which the review was undertaken and some of the main themes which emerged during the discussion.

The 1980's are a challenging era in which to create environmental legislation that will serve, and that will be perceived to serve, as an effective guardian of the quality of our environment. There is widespread understanding today that all human activities, including economic performance and human health, are inextricably linked to the quality of the natural environment; and that the threats to the environment are not all straightforward and apparent but are frequently indirect and insidious. Concern about threats to the environment is deep and widespread, embracing all sectors of society from public interest groups to industry. It is within this context of current conditions, state of knowledge, and public expectations that the Council reviewed the proposed *Environmental Protection Act*.

The Council realized that it could not undertake a comprehensive in-depth review because of the constraints of time and resources. It therefore made a conscious decision to concentrate on specific elements of the draft Act, and to put aside certain aspects which could not be examined in the time available. The latter included: the relationship of the draft Act to other federal environmental legislation, particularly to Section 33 of the Fisheries Act; the connections between the proposed Act and related legislation and practice at the provincial, territorial and municipal levels; a comparison with environmental legislation in other countries, notably the United states, in view of the current negotiations on free trade; and an assessment of the implications of related recommendations by the Law Reform Commission.

The members of the Council reached a consensus on the question of "scope" early in the discussion during the Workshop organized by Council on February 11-12. Members believe that the title of the Act implies a broader approach than is justified by the contents of the draft Act. They favour broadening the

content of the Act rather than narrowing the title to, for instance, a "toxic substances control act". This view in favour of a more comprehensive Act is reflected in a number of recommendations in the report including: application of the Act to products of biotechnology, inclusion of authority for the Minister to make regulations regarding the Environmental Assessment and Review Process (EARP), and clarification of powers to establish emission standards for control of domestic air pollution.

A recurrent theme throughout the Council's discussions was that of ministerial authority. The Council agrees that the federal Minister of the Environment should serve as an environmental leader and advocate, but it believes the the Minister's authority is unnecessarily limited by the language of the draft Act. The Council believes, for example, that the Minister should have the authority, without reference to Cabinet, to issue a "stop" or "clean-up" order in the case of a toxic spill or accidental release. Questions were also raised about the need for both the Minister of the Environment and the Minister of National Health and Welfare to recommend to Cabinet the listing or de-listing of a substance as a preliminary step to regulation, and recommends that authority for that action be assigned to "either Minister". The Council also urges that the Minister of the Environment be given authority to recommend to Cabinet environmental standards and regulations, rather than unenforceable guidelines, governing the "federal works and undertakings" of other federal departments and agencies.

The Council believes that a balance must be maintained between two vital considerations: timing (ensuring that there are no unnecessary delays in the regulatory process), and public involvement (which tends to be time-consuming). If any imbalance occurs it should be on the side of public involvement because the environment is vital to the health and economic well-being of the country. An effort should be made to ensure that there are equal opportunities for all sectors of Canadian society to participate in the regulatory process. Views on public involvement appear in several sections of the report but particularly in "Board of Review Process" and "Public Involvement", and include recommendations on: the right to petition Ministers to list or de-list substances as toxics; the right of appeal against ministerial decisions, including a decision not to list a substance as toxic; intervenor funding; the membership and procedures for Boards of Review; and the right of any person to initiate legal action in relation to any environmentally damaging activities under federal jurisdiction.

Note: This is an extract from a Council report published in March 1987. The full report is available on request.

The Council recognizes that some of its recommendations have the potential to add further delays to what may already be lengthy regulatory processes. It is concerned with timing in two respects: the "start-up" or period for initial implementation, and the amount of time required for the various processes on a continuing basis, particularly in the control of toxic substances. Its concern was heightened by the fact that in 12 years only five substances or classes of substances have been added to the list of toxic substances under the present Environmental Contaminants Act. It recommends that the proposed Act be given a "jump start" by including in Schedule IV of the draft Act a list of substances that are "generally recognized as toxic". Other recommendations aimed at reducing delays in the ongoing process include; time limitations at various stages of the review and appeal process: possible limitations on the stages at which boards of review can be required; and possible appointment of a permanent Board of Review with revolving membership.

In the Council's view, one of the main factors that will affect the timing and long-term effective implementation of the Act is the adequacy of resources, particularly highly qualified, specialized staff in Environment Canada. It does not appear to the Council that the scientific capability currently exists in Environment Canada — there are approximately 12 professionals in the department's

Commercial Chemicals Branch, compared to 200-300 in the equivalent group in the United States. The Council recommends an increase in the number of scientifically trained chemists and ecotoxicologists in Environment Canada, but cautions against any re-allocation of existing staff that would result in a decline in the effectiveness of other programs of the Department. To meet the overall requirement in the most cost-effective manner, the Council offers several additional suggestions including: extramural funding should be used to encourage development of expertise outside of government; and short-term needs should be met by hiring on a temporary basis from the private sector, and by accessing or contracting for assistance on a world-wide basis.

Another factor that will affect implementation of the proposed Act is the promised Enforcement and Compliance Policy. The Council regrets that, because only an outline rather than a draft policy statement was available for review, it was unable to make a significant contribution on this subject. The Council's views on past enforcement practices are expressed in an annex to this report.

The main text of the report contains many other recommendations that have not been mentioned in this Overview. All are offered in a constructive sense — as a means of improving a commendable initiative.

STATE OF THE ENVIRONMENT REPORT FOR CANADA

FOREWORD

Canadians, individually and collectively, interact with their environment, whether they live in urban centres and are employed in commercial-industrial complexes, or are residents of rural areas engaged as individual resource-based entrepreneurs in their woodlots, fishing boats, gardens or farms. To sustain human life is to interact with the environment. Whether we keep warm by burning wood, gas, coal or oil, we change the composition of the world's atmosphere and alter the resource base in the process. When we drive to work, or to the wilderness, we contribute our portion of residues to the land, air and water. The food we eat, and all the material we use for clothing, shelter and the equipment for daily activities, come directly and indirectly from natural resources. Our extractions and contributions represent a part of the sum total of the human effects on the global environment.

Concern about the environment and understanding of its importance to human well-being increased rapidly in Canada, and in many other countries, during the past two decades. Rapid expansion of energy use and increases in the standard of living brought incidents of severe pollution and damage to the land and water, leading in the early 1970's to outbursts of concern and confrontation, and to a degree of confusion in all sectors of society. The evidence that in some areas the quality and productivity of the environment had been and were being degraded led to fears that we would push use of our environment too far - and to the realization that it is possible to overstep the boundary of sustainable development without knowing it until it is too late. Anxiety bred a desire for reliable knowledge: how fast and to what extent were human activities causing environmental change, and how deleterious were those changes to individuals, to the economy, and to the life support capabilities of the environment?

Reporting to the public on changes in the condition of the environment and on the implications of those changes for Canadians is an essential element in the overall response to the very real concerns about the impact of our activities on the environment, as well as to the demand for reliable measurement of changes that are taking place. State of the environment reporting also serves as a multi-faceted mirror that will help us to gain a better perspective on ourselves and our land — the beauty spots as well as the scars. While the reports may record losses, they also provide us with an inventory of what we now have and a basis for measuring gains and improvements in the future. Thus they will provide a basis for planning future use and management of environmental resources. We hope that this reporting will

strengthen the commitment of Canadians to sustainable development — an approach to extraction of resources and to other uses of the environment based on the belief that drawing current benefits from the environment should not result in degradation of environmental quality for future generations.

This first report on the state of the Canadian environment is both a major achievement and a starting point. It has taken a great deal of dedicated effort to develop the concepts and to test their validity on a scientific and practical basis; to assemble and interpret data; and to bring the first report into print. While the report is valuable in itself, its greatest value will be demonstrated and appreciated in the future as this report and the data it contains serve as a baseline for subsequent reports and for systematic measurement of changes in the quality and character of our natural environment.

There is a widespread demand for the type of information contained in this state of the environment report. In recent years the demand has grown and spread from environmental organizations and individual Canadians to all sectors of society, including business and industry, labour research and educational institutions, and the various levels of government. While the data on which the report is based existed in the past, they were not readily accessible, and they were not related, interpreted and presented in an informative manner geared to the needs of the users of state of the environment data. In the Council's experience, through discussions with a variety of individuals and groups and in the personal experience of Council members, there is such a range and variety of needs — from generalized nation-wide data to information on specific issues or areas — that it appears most unlikely that this initial report will meet fully the needs of all users. It has the inestimable virtue, however, of being a beginning, a first edition that can be improved in the future in response to criticisms and suggestions from individuals and groups of users.

Council commends the authors, Dr. Peter Bird and Dr. David Rapport, and others who played a variety of supporting roles, for a major achievement. They faced a formidable task in capturing, between two covers, such an enormous and complex subject as a comprehensive, synthesized statement on the environment of all parts of Canada. Some of the obstacles were conceptual; others concerned the inadequacy or incompatibility of data, most of which had been collected for purposes other than assessing the state of the environment; and, finally, there were the obstacles of maintaining scientific credibility while making

Note: This is an extract from Canada's first national State of the Environment Report, published by Environment Canada in April 1986.

The Foreword was prepared by the Canadian Environmental Advisory Council.

value judgements and of relating financial and natural resource information in different time periods and geographic regions. There were variations in the amount and quality of data available, and therefore coverage of some subjects could not be as complete and accurate as the coverage of others. These inadequacies can only be overcome as more complete, more relevant, and better co-ordinated data are collected for future editions. The processes for collecting, interpreting and presenting the data also need to be examined to ensure that they are effective, avoid duplication, and produce accurate, representative and useful information.

The document reports on the basis of fifteen terrestrial ecozones and four aquatic ecosystems. Given the vastness and diversity of Canada, this is a logical but innovative approach. Although, at times, political boundaries had to prevail, wherever the data permit they are assembled and compared on an ecozone basis. This approach allows characteristics of the environment to be compared within ecosystems over time and between one ecozone and another at any one time. It also makes possible, for the first time, an examination of an ecosystem based not on a general description and subjective interpretation, but on quantitative data of physical, biological and dynamic response characteristics. Thus, the extent and seriousness of potential or actual environmental change, or the amount and condition of a specific natural resource and its relation to other resources, may be identified in a way not previously possible.

The Canadian Environmental Advisory Council was not directly responsible for preparation of the report, but, over the years, it has drawn attention to the need for systematic collection and dissemination of information on the state of the environment. Council gave support first to pioneering work on environmental indices and, subsequently, to development of concepts for state of the environment reporting. Members reviewed successive proposals for this report and, more recently, draft sections of the report itself. The importance that Council attaches to this activity is indicated by the following statement, which was part of a recent commentary by Council on priorities for Environment Canada ". . . public reporting on a regular basis regarding the state of the environment so that the private sector, other departments and governments, organizations and institutions, and the general public are aware of changes and trends in the condition of their environment. A regular state of the environment report should be institutionalized as a required output of the department."

The environment is the foundation on which we base all economic and social activity — in fact, it is the base of life itself. In Council's view, systematic, comprehensive, regular reporting on the state of the environment is no less indispensable to the country than a statement of national accounts or the cost of living index; it is as essential to individual Canadians as a bank balance statement or a regular medical examination. All provide a basis for assessing our condition as a nation and as individuals, and for planning our future.

EXAMINING ENVIRONMENT-ECONOMY LINKAGES

FOREWORD

The Canadian Environmental Advisory Council (CEAC) has been interested in the linkages between the environment and the economy for some time. Intuitively we have felt that environmental planning and management are cost-effective and fundamental to a sustainable economic future for Canada. This report reflects an effort by Council to be more specific, to begin to document the linkages, to take a preliminary look at current literature in the field, and to develop useful methods for understanding environment-economy relationships. Without this understanding, Canadians will continue to make both economic and environmental decisions without appreciating how important they are to each other. The natural environment is, after all, the support system for all forms of human activity.

This paper proposes a way to describe and measure the relationship between Canada's economy and the natural environment. Certainly, history has taught us that some forms of economic activity can harm the environment. Fortunately, there is now a growing understanding that many steps taken to protect the environment can generate economic benefits and, moreover, that sustainable economic performance depends on protecting the environment. In other words, rather than being diametrically opposed, economic performance and environmental quality are different sides of the same coin. In addition, Canadians value their environment for cultural, aesthetic and spiritual reasons. In many cases, these values in themselves provide all the justification that is needed for intensive protection of the environment.

Although Council has focused on economic factors in this study, it does not signify that less importance should be attached to other environmental values. Nevertheless, from an economic standpoint, it is Canada's environment that provides the raw materials to drive the economic system. Ironically, it is also the environment that serves as the recipient of unwanted by-products from the economic system it feeds.

Many of our natural resources are commonly described as "renewable". But they are renewable only if carefully managed to ensure sustainable use. For those that are non-renewable, we have a special obligation to ensure their use is environmentally sound. In short, it is becoming clear that the durability of our society may well depend on the degree to which we apply a conservation or environmental ethic to the economic system.

This study of linkages between the environment and the economy involved carrying out a preliminary review of current relevant liter-

ature, identifying different theoretical perspectives, reviewing methodologies and analytical approaches, and searching selected databases to determine the availability and quality of data pertinent to a few sample linkages.

The research revealed that environment-economy relationships are extremely complex and, at present imperfectly understood and described. It also revealed that sharp differences of opinion exist among theoretical economists concerning the interactions and dependencies between economic activity, human welfare and the natural environment. However, the diversity of views on the subject should not, in our opinion, deter further examination of the relationships. Nor should it distract us from encouraging greater understanding and awareness of the intimate relationship among economic performance, environmental quality, and the quality of human society. Finally, we should not await some faroff day when all differences of opinion have been resolved and mountains of specific data generated before we incorporate into policy-making some understanding of environment-economy relationships.

Council views this study not as an end in itself, but rather as a starting point: a starting point for Council in its examination of specific linkages and the related cost or value. However, most importantly, the study is a possible starting point for other institutions, groups, and organizations undertaking the in-depth examination of environment-economy linkages.

In the final chapter of this report a number of recommendations for future action are presented, along with a summary list of research that should be carried out. Council does not suggest that all studies in the field must follow the broad holistic approach recommended in Chapter 3. For example, in some instances, narrowly-focused studies may be more cost-effective. However, such studies must implicitly or explicitly recognize the limitations imposed by a less holistic framework.

Council is convinced that further research on environmenteconomy linkages is needed to ensure that Canadian policy makers and others making decisions and formulating action plans, have a better understanding of the interactions that occur between the economy and the natural environment. The need for further research is urgent. Over the long-term, our socio-economic system reacts totally with, and is totally dependent on the natural environment.

Note: This is an extract from a report published by the Council in 1986. The full report is available on request.

FREER TRADE AND THE ENVIRONMENT

EXECUTIVE SUMMARY

The Canadian Environmental Advisory Council (CEAC) met in January 1986 to discuss the emerging environmental issues associated with the planned bilateral freer trade talks with the United States and the next round of multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT). The Council's interest in both rounds of trade negotiations grows from the fact that economic performance and environmental quality are closely linked, and the realization that the natural environment is the base upon which all economies are built.

Differences in national value systems was noted as one of the key underlying factors in trade negotiations. They are reflected in different approaches to stewardship of environmental quality, and if not understood, the differences can be a disrupting influence on trade negotiations.

CEAC's preliminary discussions were wide ranging, but concluded that at least three principles relating to the environment should remain inviolate in trade talks:

- Canada's ability to manage renewable and non-renewable resource use;
- 2. Canada's ability to control pollution and waste disposal; and
- 3. Canada's ability to protect natural ecosystems.

The above principles are not unique to the Canadian experience, but are of universal application. Their implementation should be beneficial to all countries.

Six major direct effects of freer trade on environmental protection and resource management in Canada have been identified. The three principles stated above apply to each of the effects either singly or in combination. CEAC concludes that none of the potential effects are inevitable and all are controllable. The direct effects include:

- necessary environmental regulation and enforcement, subsidies and tax incentives, may be regarded as non-tariff barriers;
- 2. opportunities to develop uniform standards, testing and approvals;
- 3. pressures to reduce costs by lowering environmental requirements in the absence of uniform standards:
- 4. foreclosure of options to sustain renewable resources in perpetuity;
- 5. a possible diminution of corporate citizenship; and
- the potential for water export discussions prior to the development of a National Water Policy.

A number of follow-up activities have been suggested by CEAC as an initial list of necessary actions. These include: a need for public consultation and education on the environmental implications of freer trade negotiations; the requirement for comparative data on environmental standards and regulations in Canada, the United States, and ideally the European Economic Community and NATO; creation of an expanded set of environmental principles for use as a guide by the negotiating teams; the provision to Canadian negotiators of a list of environmental non-negotiables; a commitment by the federal government to discuss the environmental aspects of freer trade with the Canadian Council of Resource and Environment Ministers; and discussion of the topic, initiated by CEAC, at the 1986 Assembly of Environment Councils of Canada.

Mr. Tom Beck, Chairman of CEAC, commented at the conclusion of the preliminary review that there is a rapidly growing interest in the environmental effects of freer trade, and as a result there is an immediate need for study and research to ensure informed public opinion.

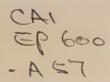
Note: This is an extract from a report published by the Council in May 1986. The full report is available on request.







Government



1987-88 1988-89 Canadian

Environmental

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Council

Review of Activities





Canadian

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Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Secretary Canadian Environmental Advisory Council c/o Environment Canada Ottawa, Canada K1A 0H3

Ce rapport est disponible en français

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council (CEAC) is a body representing a cross section of Canadians who are knowledgeable and concerned about the environment. It operates in a confidential advisory capacity to the federal Minister of the Environment. It provides the Minister with an alternative to the advice provided by the Department of the Environment (Environment Canada) and other federal agencies, and to the advice of specific interest groups. Council's public role, in terms of activities such as the publishing of reports, is therefore secondary to its primary function of providing advice to the Minister of the Environment.

Minister of the Environment Ottawa, Canada

Dear Minister:

It is with great pleasure that I submit to you the Council's Review of Activities for the period 1 April, 1987, to 31 March 1989. The Council was very active during this period, particularly with respect to the Canadian Environmental Protection Act, the Environmental Assessment and Review Process, and the followup to the release of the report of the World Commission on Environment and Development.

On behalf of all Council members, I would like to convey to you our best wishes and our commitment of future service.

Sincerely,

Robert Page Chairman



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COUNCIL OPERATIONS

Membership

During the period covered by this report, 1 April 1987 to 31 March 1989, membership in the Council reached the lowest number in recent years. For a brief period the Council operated with only six members, but as the short-term funding for the Council improved and its future role was clarified, several new appointments brought the regular membership up to 11 by March 1989.

This period began with the appointment of a new Chairman, Dr. Robert Page of Trent University, Peterborough. Dr. Page was first appointed to the Council in 1985. He had previously served as the Chairman of the Environmental and Resource Studies Program and was a Director of the Frost Centre for Canadian Heritage and Development Studies at Trent University.

The following members completed their terms during 1987-88 and 1988-89:

Mr. J.L. Fryer National Union of Provincial Government Employees Ottawa, Ontario

Dr. J.A.F. Gardner University of British Columbia Vancouver, B.C.

The appointments of the following members were changed or extended during the period:

Dr. Robert Page, appointed Chairman, 1 April 1987;

Mr. Tom Beck, former Chairman, appointed Chairman Emeritus, 1 April 1987;

Dr. Shirley A.M. Conover, re-appointed as a vice-chairperson;

Dr. Lorne Giroux, re-appointed as a member.

The following new members were appointed during this period:

Dr. Jim Butler University of Alberta Edmonton, Alberta

Dr. Peter Chapman E.V.S. Consultants Ltd., North Vancouver, B.C. Mr. J. Doug Cook Esso Petroleum Canada Toronto, Ontario

Dr. Hélène Connor-Lajambe Centre d'analyse des politiques energetiques St-Bruno de Montarville, Québec

Mr. Glenn Warner Northwest Territories Water Board Yellowknife, N.W.T.

A complete list of members as of 31 March 1989 appears in this Review as Annex A.

Meetings

The Council began this period on a hesitant note because of funding problems, but as short-term resources were provided it developed a heavy schedule of workshops, task forces and Council and Executive Committee meetings.

During the 24 months covered by this review, the Council held 11 meetings of the full Council and an equal number of meetings of the Executive Committee. Increased emphasis was placed on holding meetings in various parts of the country in order to gain first-hand knowledge of environmental issues and to improve contacts with local and regional public interest groups and government officials. Of the 22 formal meetings, only nine were held in the Ottawa area. Other locations included: Charlottetown, Toronto, Halifax, Saskatoon, Regina, St. Andrews, Vancouver and Victoria. Two of the above Council meetings were scheduled to coincide with the annual assemblies of federal and provincial councils — the October 1987 meeting held in Toronto, Ontario and the September 1988 meeting held in St. Andrews, New Brunswick.

One event worthy of note was the holding in February 1988, of the 100th meeting of the full Council. Meeting No.1 was held on 10 May 1972, shortly after the Council was formally established.

There were numerous meetings of groups of members set up as task forces to guide the Council's efforts on several projects. The Council also continued to harness the talents of its alumni for workshops on major issues, including: the Canadian Environmental Protection Act, Amendments to the National Parks Act, Land Use Planning and Sustainable Development, PCB Waste Destruction, and the Environmental Assessment and Review Process (EARP).

In preparation for the workshop on EARP, the Council held a joint meeting with the Canadian Environmental Assessment Research Council (CEARC).

Representatives of the Council also met in November 1988 with representatives of the Council on Environmental Quality (CEQ), an advisory body to the President of the United States, as a preliminary step toward arranging a future joint meeting of the two councils.

Publications

Of the major issues studied by the Council during this twoyear period, four resulted in the publication of formal reports. This reflected the Council's primary role as an advisor to the Minister of the Environment. Much of the advice was provided in an informal manner, either orally or in writing. The section of this review entitled "Council Studies and Reviews" indicates the nature of that advice.

The Council published the following four reports during this period:

Canada and Sustainable Development

This report was the Council's commentary on *Our Common Future*, the report of the World Commission on Environment and Development (Brundtland Commission), and its implications for Canada.

Listing Toxics Under CEPA — Is the Chemistry Right?

This was a follow-up to the Council's earlier work on the proposed Environmental Protection Act, but examined in more detail the listing and regulation of toxic chemicals.

Preparing for the 1990s: Environmental Assessment, an Integral Part of Decision Making

The Council undertook a review of the

Environmental Assessment and Review Process (EARP) at the request of the Minister, and this report documented the Council's findings and recommendations.

PCBs: A Burning Issue

This report was prepared by the Council in response to a request by the Minister for advice on the siting of a mobile PCB incinerator.

A complete list of the Council's publications to date appears in this Review as Annex B.

Staff

Two full-time staff continued to provide support for the Council's operations during this period, with additional assistance obtained through temporary help and service contracts. One additional position was added late in 1988 and it was filled on a temporary basis. Staff support included organizing meetings of the Council, Executive Committee and task forces; researching and gathering information on subjects under review by the Council; preparing or editing reports, managing contracts, and performing other administrative responsibilities.

In addition to the work associated with the Council's studies and publication of the four reports described above, the staff completed work on several administrative and communications projects including: design of a new logo and stationery, installation of computers and fax machines to increase efficiency and speed up communications, and preparation of new organization and staff profiles.

There was one change in the staff during this period. Mr. Max McConnell, who had served as Executive Secretary and then Executive Director since 1982, retired in August 1988. Mr. Ken Ogilvie, who had previously served with the National Task Force on Environment and Economy, took over as the Acting Executive Director. Mrs. Veena Halliwell continued as Project Coordinator.

COUNCIL STUDIES AND REVIEWS

During the 24 month period from 1 April 1987 to 31 March 1989 the Council made an effort to focus its efforts on a few high priority issues and to undertake in-depth analyses on those issues. This proved difficult because of the number of major issues that arose during this period requiring Council's advisory attention, and the need for follow-up work on studies undertaken in previous years. Because of the circumstances and the Council's limited resources, it was necessary to delay action on some topics until future years.

"Sustainable Development" was the main theme during 1987-88 and 1988-89. The studies and activities which were directly related to that theme have been grouped at the start of this section of the review: Canada and Sustainable Development, National Task Force Report and National Round Table, Land Use Planning and Sustainable Development, and Environment and Economy.

Canada and Sustainable Development

The 1985-87 Review of Activities described the Council's work in relation to the World Commission on Environment and Development (WCED) or Brundtland Commission, up to the point where the report was ready for release. The report, *Our Common Future*, was made public in April 1987 and made a powerful case for global adoption of sustainable development — an approach linking environmental quality and human activities, including those of an economic nature.

There was concern in the Council that the Commission's report would gradually lose momentum unless there was specific follow-up action. At the Minister's urging the Council undertook the preparation of a statement, in part as a contribution towards Canada's presentation to the United Nations General Assembly, but beyond that as a means of promoting further discussion and action on sustainable development. The Council commissioned two background papers and began preparation of a report. The draft formed the basis of a half-day discussion with the Minister in August 1987 prior to the October meeting of the UN General Assembly. The final report, Canada and Sustainable Development, was published in December 1987.

The Council focussed its attention on three areas of longterm environmental interest:

 Attitudes to the Environment: "Sustainable development will not be realized if there is no change in the popular perception of the natural environment as a limitless storehouse of wealth for human consumption".

- Information and Environmental Analysis: There is a need for understanding of the environment and human interaction with it, based on both the natural and social sciences.
- Institutions: Within government and industry, organizational re-structuring is required to ensure that all agencies undertaking economic development projects assume responsibility for the environment at the earliest stages.

National Task Force Report and National Round Table

These initiatives were major focal points for study, discussion and support by the Council during this period. The National Task Force (NTF) on Environment and Economy was established in October 1986 by the Canadian Council of Resource and Environment Ministers (CCREM) to anticipate and follow-up on the report of the Brundtland Commission, and to promote environmentally sustainable economic development. Its membership included seven ministers of the environment, seven representatives of the corporate sector, two from environmental interest groups, and one from the academic sector. The report of the National Task Force was presented to CCREM in September 1987 and received overwhelming support across Canada. One of its most important recommendations called for the establishment of Round Tables on Environment and Economy at the national, provincial and territorial levels. The round tables would serve as for a senior decision-makers from all sectors to work toward consensus on environment-economy integration.

The Council viewed the report as a major step toward bringing the environment into the centre of decision-making by industry and government. The main concern of the Council was that moves be made quickly to translate the recommendations of the Task Force into action before the initiative lost momentum.

Members of the Council focussed their support efforts primarily on action at the national level. No major studies were undertaken by the Council as a direct follow-up to the Task Force report, but the Council provided advice and support to the Minister, and members met informally with senior government officials, representatives of industry and public interest groups to promote actions on the recommendations of the Task Force. During these discussions, the Council urged action to establish the National Round Table on Environment and Economy, and called for the addition of the National Task Force Report to the agenda of the First Ministers' Conference in November

1987. The NTF Report was discussed by the First Ministers, and the National Round Table was established in 1988-89.

Throughout this period the Council also helped to promote action on the report of the National Task Force throughout the country by consultation with provincial environment councils. A resolution endorsing the recommendations of the National Task Force was adopted at the 1987 Assembly of Environment Councils. The resolution urged that First Ministers assume "an overall leadership role and demonstrate a commitment to environment-economy integration..." The complete text of the resolution appears in this Review in the section, "Assemblies of Environment Councils of Canada".

Land Use Planning and Sustainable Development

Early in 1988 the Council decided to undertake a study on land use planning as part of its follow-up to the Brundtland Commission's report. In the Council's view, land use planning had generally been perceived and practised within a very narrow, and usually localized, context. In reality, "land" in its broadest geographical sense embraces the accessible space at the earth's surface, i.e. the soil-waterair interface, and ecologically-oriented land use planning is the primary route toward achieving sustainable development.

The Council commissioned a study on land use planning from this perspective mid-way through 1988. It was hoped that the study would play a role in expanding the practice of land use planning from that of a functional specialty to that of a broad ecology-based approach to environmental management. The specific objectives of the study were: to identify general principles of land use planning and their application to the achievement of sustainable development; to examine the federal interest and role in land use planning; to stimulate interest and debate; and to motivate changes in land use planning.

In October 1988 the Council held a workshop on the subject and reviewed two drafts of the study report. By year-end the report was nearing completion and was scheduled to be published early in 1989-90.

Environment and Economy

The Council's earlier work on environment-economy linkages, including follow-up to the report produced in 1985-86, was carried on under the umbrella theme of sustainable development. No major projects were completed during the period covered by this Review, but the Council continued its efforts to encourage studies by other groups and organizations, including the Economic Council of Canada.

Some initial planning was undertaken for a study on "Economic Incentives for Environmental Decision-Making". A preliminary discussion paper was prepared which identified a range of incentives, from grants or tax credits for the installation of pollution abatement equipment to a tax on pollutant emissions.

Further action on this initiative was pending at the end of 1988-89.

Canada's International Role

Canada's role in environmental issues on a global basis was a second main theme adopted by the Council for its activities during this period. While there were no major studies undertaken to directly reflect this theme, the international aspects were incorporated into a number of the Council's activities, particularly in its report *Canada and Sustainable Development*, and its statement on the Environmental Assessment and Review Process. The Council's international interests also included a number of other activities that, in total, comprised a significant element of the Council's work. They included the following specific topics:

The Council strongly supported the establishment of the Centre for Sustainable Development in Winnipeg, announced by the Prime Minister at the United Nations General Assembly in September 1988. In the view of the Council, the Centre would provide an important avenue for advancing sustainable development in Canada and internationally.

Members reviewed the new "Environment and Development" policy of the Canadian International Development Agency, and commented informally. The Council viewed Canadian aid to developing countries as another major avenue for encouraging adoption of a sustainable development approach on a global basis.

The Council supported a Canadian initiative for the establishment of a Nobel-style award for outstanding achievements in the earth and environmental sciences. Discussions were still underway at the end of 1988-89.

In its report, Canada and Sustainable Development, the Council proposed that Canada host a circumpolar conference on sustainable development and northern conservation strategies. The Council raised this proposal formally but, because there were several somewhat similar proposals, shifted its support to an initiative by Finland for international discussion on environmental protection in the Arctic.

Global Environmental Research

The Council scheduled a briefing for the Minister at the Council's August 1987 meeting on current findings from programs of interdisciplinary environment-related research being undertaken on a global basis. The briefing was held shortly after the quadrennial meeting of the International Union of Geodesy and Geophysics. The meeting was held in Vancouver and attended by approximately 4,000 scientists from 150 countries. Many of the scientists were reported to be alarmed because current research indicated that the condition of the Earth was much more serious than previously thought. This was being brought about by a combination of natural, on-going processes of change: current cyclical changes including solar flares and changes in the Earth's orbit that created stress patterns resulting in increased frequency of earthquakes and volcanoes that in turn were affecting climate; and, finally, human-made or human-influenced changes such as the greenhouse effect, thinning of the ozone layer, loss of forest cover and desertification. In particular, research indicated that the environment was less stable than had been previously thought, and that changes in the ecosphere were easily triggered by human activity.

The rapid expansion of understanding of natural processes and human-induced changes in the ecosphere was largely brought about through recent developments in research technologies — computers, satellite observations. experimental biology, and by new concepts and theories that joined geophysical, chemical and biological processes. This new understanding made it feasible to plan a longterm. planet-wide, multi-disciplinary study, called the International Geosphere-Biosphere Program of the International Council of Scientific Unions, which will involve and draw information from many disciplines and countries. The Council was concerned about Canada's ability to make an effective ongoing contribution to the global research network, and its ability to make proper use of the data being produced. In the Council's view, Canadian science was falling behind science in many other countries because of their broader perspective on science; there were increasing difficulties in reflecting scientific findings in the development of policy; and there was a growing trend in Canada toward compartmentalization of science into a series of specialties which hampered our ability to understand and use the results of international, interdisciplinary science.

The Council considered several alternatives for future action including: periodic briefings of the Minister on current research; a series of seminars on the habitability of the planet to bring research findings to the attention of leaders in the public and private sectors; a presentation at an assembly of councils; and the preparation of a report or periodic reports on global environmental research findings.

Environmental Assessment and Review Process (EARP)

At the Minister's request, the Council undertook an independent review of the Environmental Assessment and Review Process. Proposals for change were made in a discussion paper, Reforming Federal Environmental Assessment, that was released in September 1987. The Federal Environmental Assessment Review Office (FEARO) held a series of public consultations across Canada in November and December, and a final national consultation meeting in Ottawa in March 1988. As part of its independent review, the Council commissioned two background papers, held a joint meeting with the Canadian Environmental Assessment Research Council, and organized a workshop involving members and alumni of the Council in Toronto in January 1988. The Council's report Preparing for the 1990s: Environmental Assessment, an Integral Part of Decision Making, was submitted to the Minister and released at FEARO's national consultation meeting in March 1988.

The Council's previous involvement with EARP included recommendations on the initial establishment of EARP, a formal critique of the Process in 1979, and several informal proposals for revisions to the Process. The review undertaken in 1987-88 resulted in proposals for sweeping changes — 52 in all — in the way the environmental effects of federal government activities are assessed. The proposed changes included: entrenchment of EARP in legislation (also proposed in the Council's review of the proposed Environmental Protection Act); application of EARP to all federal departments, boards. agencies, crown corporations and regulatory bodies; a new high level environmental review mechanism for policies and programs in addition to assessment at the project level; greater opportunity for public involvement, including the provision of funding for citizen interventions; application of EARP to external aid projects; and increased powers and responsibilities for the Minister of the Environment.

Throughout 1988-89 there were informal consultations with the Minister and with FEARO on follow-up including the drafting of legislation.

Canadian Environmental Protection Act (CEPA)

Throughout the first half of the period under review, the Council was engaged in extensive follow-up to its work on the proposed Environmental Protection Act. This work was initiated late in 1986-87 and resulted in the publication of a report titled, *Review of the Proposed Environmental Protection Act.* During the initial stages this included discussions with the Minister, officials of Environment

Canada, and staff of the Department of Justice. Recommendations were made for further changes to the Act, including the addition of a definition of environment.

Following the tabling of the revised Act in the form of Bill C-74 in June 1987, the Council commissioned reviews from legal and scientific perspectives and made an analysis of the changes from the 1986 proposed Environmental Protection Act to the 1987 Canadian Environmental Protection Act. This work was undertaken in anticipation of a possible call to appear before the Parliamentary Committee reviewing Bill C-74.

The Council was particularly concerned about the need for inclusion of a priority list of toxics to "jump-start" action to control toxic chemicals as recommended in its initial study. In order to avoid duplicating the work of the Priority Substances Advisory Panel which was appointed by the Minister, the Council liaised with the Panel and focussed on the process for developing lists of toxic chemicals.

A working group of members undertook a review, and its report, Listing Toxics Under CEPA — Is the Chemistry Right? was submitted to the Minister in May 1988, and through the Minister to the Priority Substances Advisory Panel. A number of recommendations were made in the Council's report. In particular the Council cautioned that assessment and regulation under CEPA would not be effective if they were based solely on single-chemical lists, and that there was a need to incorporate bioassessment into the regulations in the form of toxicological testing. The Council also urged that any list of toxic chemicals be criteria-driven and include provisions for the addition and deletion of chemicals.

PCB Waste Destruction

In response to a request from the Minister, the Council undertook a study on an urgent basis of a proposal to incinerate federal PCB wastes. The study was launched in September 1988 and the report was completed and submitted to the Minister in February 1989.

Initially, the Council was asked to advise on possible sites for a mobile incinerator to destroy federal PCB wastes. The terms of reference were subsequently broadened to cover the process to be used in siting a mobile PCB incinerator, and the technological, social and public policy issues relevant to the federal PCB waste destruction program. During the course of its study the Council consulted with public interest groups, industry and federal and provincial officials. In particular, the Council organized a two-day workshop in Toronto at which experts on the siting of hazardous waste facilities joined Council members and representatives of environmental groups to discuss siting principles and issues.

The Council prepared a report titled *PCBs: A Burning Issue*, in which recommendations were made on the key elements of the process that the federal government should follow if it wanted to proceed with the siting of a mobile incinerator. As an alternative, the Council suggested a broader approach to the destruction of federal PCB wastes than simply the reliance on mobile incinerators. The Council recommended that the federal PCB program should be part of a national hazardous waste management program which would be developed by the Canadian Council of Resource and Environment Ministers. A complete list of the Council's recommendations, and a description of the rationale for its approach and conclusions, is included in the report.

Amendments to the National Parks Act

A review of proposed amendments to the *National Parks Act* was started late in 1986-87 following the tabling of Bill C-30 in the House of Commons and in response to a request from the Minister for advice from the Council. A working group of Council members undertook an analysis of the amendments. The group held two workshops, and consultations with representatives of interested groups. The amendments were discussed at several meetings of the full Council.

The Council supported the general thrust of Bill C-30, including the increase in fines for poaching, the establishment of wilderness areas within existing parks, the proposal for a Citizens Heritage Fund, and the legislation of boundaries for Banff and Jasper townsites and for ski areas within the national parks. Members cautioned that, while the *National Parks Act* was an effective tool for managing Canada's national parks, there were three factors of greater significance: the policies through which the Act is implemented, the level of funding provided, and the vision as to what our Park system will be as we enter the 21st Century.

The Council also recommended several additions to Bill C-30 including: specific provision for the establishment of National Marine Parks; provision for cooperative agreements with provinces, territories or private organizations; a legislated requirement for public consultation on new policies, new management plans, changes to boundaries, and large developments; inclusion of the first two principles of preservation of renewable resources from the *World Conservation Strategy*; and a legislated requirement for a biennial report to Parliament on the state of the park system.

National Park Establishment

The same Council working group that undertook an analysis of amendments to the National Parks Act also reviewed the report of the Task Force on Parks Establishment, *Parks*

2000, Vision for the 21st Century. The Task Force was established by the federal Minister of the Environment in April 1986 in response to a proposal by the Canadian Parks and Wilderness Society. The report of the joint public and private sector Task Force was released in June 1987.

The Council strongly supported the report's bold and imaginative vision and plan for the national park system into the 21st Century, and hoped that the enactment of the amendments to the National Parks Act would clear the way for action on the recommendations in the report. In particular, the Council supported the concept of "Canadian Heritage lands designation", noting that it provided a good mechanism for shared mandates between the provinces and the federal government, and that "the main priority is legal protection of important areas, not who is responsible for protection". The Council also noted that there were critical differences between new northern parks being created through land claim settlements and those in southern Canada. The differences included the requirements of native people for subsistence hunting and trapping, and the greater environmental sensitivity of northern parks. In the Council's view, the potential conflict created by these circumstances could be avoided through the heritage land designation.

The Council also commented on several current issues in national parks policy and administration including: advocacy by parks officials; the need for research and environmental monitoring in heavy use areas; phasing out of non conforming uses; and improved arrangements for joint management with native people.

During this period the Council supported and promoted the establishment of South Moresby and Grasslands national parks. It recommended that the establishment of new national parks at Saguenay, East Arm of Great Slave Lake, Lancaster Sound-Bylot Island, and Banks Island be included in the short-term priority list.

Future Role and Resources

Throughout this two year period the process of re-thinking and negotiating the future role of the Council, and the appropriate resources to perform that role, continued. Questions on the future role appeared to be resolved with the Minister's desire for the Council to increase its research and public education capability. The Council would continue operating in a confidential advisory capacity to the Minister, which had been its traditional role.

The need for re-thinking of the Council's role was prompted by a number of public proposals for change, or for establishment of a new form of council; by changes in the number, nature and severity of environmental problems; by the increasing public and private sector sensitivity to environmental issues; and by related institutional changes such as the establishment of provincial and national round tables on environment and economy. As part of this process of change, the Council commissioned a study of the different kinds of council and their characteristics as a background document for both current and future discussions. The study was nearing completion in March 1989.

Other

State of the Environment Report (SOE)

The Council's long-term activity on state of the environment reporting reached a peak during the months prior to publication of Canada's first national state of the environment report by Environment Canada in May 1986. After that time the Council continued to maintain a support and monitoring role. Members reviewed documents concerning the new SOE Advisory Board, the support organization in Environment Canada, and the agreement between Environment Canada and Statistics Canada. The Council noted in particular the need for improved systems to be built into the SOE reporting system, and the need for biological indicators as a means of measuring progress and maintaining scientific rigour.

Northern Environmental Issues

In response to requests from the Minister, the Council reviewed current northern environmental issues and provided advice. In particular, the Council supported the Minister's decision to ensure that the Environmental Assessment and Review Process would be applied to all new projects in the North, and prepared to support Canadian representations against the United States proposal to allow oil and gas development in the Arctic National Wildlife Refuge. This proposal was of particular concern because the Refuge is the main calving ground for the Porcupine caribou herd that migrates between the Yukon and Alaska. Oil and gas development would have an adverse effect on the herd, and on other shared migratory species.

Federal Water Policy

During this period the Council followed through on earlier work on water management, including its discussions on the report of the Inquiry on Federal Water Policy (Pearse Inquiry). Members reviewed the new *Federal Water Policy* which was released in November 1987, participated in a workshop organized by the Science Council of Canada, and reviewed the Science Council's subsequent report released in May 1988, *Water 2020 — Sustainable Use for Water in the 21st Century.* The Council participated in the 1988

Assembly of Environment Councils which recommended that the federal and provincial governments proceed with the development of "a comprehensive and coordinated water policy which will ensure a sustainable use and availability of our water resources for the present and future generations of Canadians".

Environmental Implications of Trade

Monitoring of developments on this subject continued during the 1987-89 period. Demand for copies of the Council's preliminary review, *Freer Trade and the Environment* continued. Because of other priorities, the Council was unable to undertake any follow-up studies, but reviewed the output of workshops and studies undertaken by other groups. In its discussions the Council emphasized one particular point: that trade negotiators should not bargain away the ability of the resource base to produce. The Council noted that the sustainability of the resource base needs to be a concern shared by all nations.

Environmental Awards

In 1988 the federal Minister of the Environment launched a new series of National Environmental Achievement Awards, and early in 1989 the Minister asked the Council to make the final selection of winners. The first awards ceremony was in June 1989.

Energy Options

The report of the Advisory Committee on Energy Options, Energy and Canadians: Into the 21st Century was released by the Minister of Energy, Mines and Resources in August 1988. Individual members of the Council had participated on the Energy Options Advisory Committee and in the consultation process which led to preparation of the report. The Council was pleased with the amount of attention given to environmental concerns in the report, but felt that it dealt with relatively short-term issues, and that it should be considered a first step in a continuing process of public consultation. At the end of 1988-89 the Council was considering its future contribution to the energy options consultation process, including an in-depth study on how sustainable development concepts can be integrated into the energy policy framework. The Council noted that there is no issue more central to sustainable development than the relationship between energy policy and the environment.

Nitrogen Oxide Emissions

The Council discussed the question of NOx emissions and the Canadian position during negotiations in Geneva and provided a letter containing its recommendations to the Minister. The Canadian government's approach was endorsed. The Council recommended that Canada continue to press for a reduction to pre-1987 levels of emissions across the board and speed up the implementation of Stage II of the reductions.

The Council recommended that Canada leave the negotiating table without signing any accord if agreement with the U.S. on reductions could not be achieved. Instead, Canada should announce and commit to its own level of reduction, in accord with the pre-1987 levels of emissions. The Council's recommendation was endorsed by the Minister.

ASSEMBLIES OF ENVIRONMENT COUNCILS OF CANADA

Two assemblies of the federal and provincial environment councils were held during the period under review. The assemblies enable the councils to exchange ideas, share common problems, learn from the experience of others, and build support for shared ideas and concepts. They have been held on an annual basis, with a few exceptions, since 1975, and are hosted alternately by the participating councils.

During this period assemblies were hosted by councils in Ontario and New Brunswick. A brief description follows, along with the recommendations or resolutions adopted at each. Because of the informal nature of the assemblies, resolutions are accepted with the understanding that each council will take action on the resolution according to its own views and circumstances.

1987 Assembly

The 11th Assembly of Environment Councils of Canada was held in Toronto and hosted by the Ontario Environmental Assessment Advisory Committee. In addition to Ontario, participants included Alberta, Quebec, New Brunswick, Nova Scotia and Prince Edward Island. The Canadian Environmental Advisory Council was represented by five members.

The overall theme of the Assembly was "Environment and Economy", with specific discussions focussed on the *Report of the National Task Force on Environment and Economy*, economic implications of environmental regulation, sustainable development, and conservation and sustainable development strategies.

The following resolution was passed at the conclusion of the assembly:

"The Environmental Advisory Councils of Alberta, New Brunswick, Nova Scotia, Prince Edward Island, Quebec, Ontario and Canada in the assembly at Toronto on October 23, 1987 unanimously endorsed the recommendation of the `Report of the National Task Force on Environment and Economy' that:

The First Ministers must assume an overall leadership role and demonstrate a commitment to environment-economy integration by:

- Directing that cabinet documents and major government economic development documents demonstrate that they are economically and environmentally sound and therefore sustainable.
- Discussing environment-economy integration at First Ministers' Conferences.
- Ensuring that all levels and departments of government establish consultation processes which encourage and facilitate public involvement and influence in policy-making and planning processes.

- Establishing formal mechanisms to hold Ministers and their departments accountable for promoting environmentally sound economic development.
- Developing an environmental code of ethics and principles, including principles of prior notification and consultation, which will provide guidance on the management of environmental matters among governments in Canada."

1988 Assembly

The 12th Assembly of Environment Councils of Canada was held in St. Andrews and hosted by the Environment Council of New Brunswick. In addition to New Brunswick, participants included Manitoba, Prince Edward Island, Ontario and Quebec. The Canadian Environmental Advisory Council was represented by seven members.

The overall theme of the Assembly was "Setting the Environmental Agenda for a Canadian Freshwater Policy for the Year 2000." Discussion was generated through three workshops: "The Economy of Water", "Environmental Impact Assessments and Their Use in Formulating a Water Use Policy", and "Public Education and a Water Use Policy".

The following recommendations were developed through the workshop and plenary discussions:

- "1.For projects having potentially significant environmental impacts, there should be a mandatory environmental impact assessment which would include an independent public review. Explicit and publicly stated criteria should be developed to determine whether a project has potentially significant environmental impacts.
- 2. We recommend that no large volume interbasin transfers be permitted, with small volume transfers being allowed on a case by case basis.
- 3. Considering that water is a vital element for humans and all biotic life, it is important that Canada and its provinces adopt stringent measures to protect and ensure a sustainable utilisation of their water resources. The Provincial Advisory Councils and the Canadian Environmental Advisory Council during their annual meeting at St. Andrews, N.B. recommend that water resources be placed on the agenda of the upcoming CCREM Conference and that they proceed with the development of a comprehensive and coordinated water policy which will ensure a sustainable use and availability of our water resources for the present and future generations of Canadians."

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Dr. Tom Beck Calgary, Alberta Chairman Emeritus

Staff

Mr. Ken Ogilvie Executive Director

Mrs. Veena Halliwell Project Coordinator

Dr. E. Fred Roots Science Advisor

LIST OF PUBLICATIONS

Reports

- (1) An Environmental Impact Assessment Process for Canada, February 1974 (out of print).
- (2) An Environmental Ethic Its Formulation and Implications, by N. H. Morse, January 1975 (out of print).
- (3) Harmony and Disorder in the Canadian Environment, by P. Danserau, 1975 (English out of print).
- (4) Towards an Environmental Ethic, by D.A. Chant, March 1977 (out of print).
- (5) Environmental Aspects of Nuclear Power Development in Canada, by H. E. Duckworth, H. W. Porter and J. S. Rogers, 1977 (out of print).
- (6) Report of the Second Joint Meeting of Environmental Advisory Councils, May 1977, Fort San, Saskatchewan. (Produced in collaboration with the Saskatchewan Environmental Advisory Council, March 1978).
- (7) The Management of Estuarine Resources in Canada, by I. K. Fox and J. P. Nowlan, March 1978.
- (8) Report of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council, May 1978.
- (9) Ecotoxicity: Responsibilities and Opportunities by R. H. Hall and D. A. Chant, August 1979.
- (10) Report of a meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Published in 1981.
- (11) A New Approach to Pest Control in Canada, by R. H. Hall, July 1981
- (12) Wildlife Conservation Issues in Northern Canada, by I. McTaggart-Cowan, October 1981.
- (13) Water Management Problems in the Third World: Lessons for Canada, by P. F. M McLoughlin, March 1983.
- (14) Terms of Reference, March 1984.
- (15) Report of the Eighth Assembly of Environment Councils of Canada, May 1984.
- (16) Selected Papers from Assemblies of the Environment Councils of Canada, 1975-1980, March 1985.
- (17) Sustainability of Farmed Lands: Current Trends and Thinking, by C. F. Bentley and L. A. Leskiw, March 1985.
- (18) Examining Environment-Economy Linkages, by R. A. Knowles, 1986.
- (19) Freer Trade and the Environment, May 1986.
- (20) Enforcement Practices of Environment Canada, by L. Giroux, June 1985. Published January 1987.
- (21) Review of the Proposed Environmental Protection Act, March 1987.
- (22) Canada and Sustainable Development, December 1987.
- (23) Preparing for the 1990s: Environmental Assessment, an Integral Part of Decision Making, February 1988.

- (24) Listing Toxics Under CEPA Is the Chemistry Right?, May 1988.
- (25) PCBs: A Burning Issue, February 1989.

Annual Reports

Annual Review 1973-1974. Part A — Activities. Part B — Problems and Priorities in the Canadian Environment.

Annual Review 1975. Part A — Activities. Part B— Significant Environmental Problems.

Annual Review 1976. Part A — Activities. Part B— The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A — Activities. Part B — The State of the Canadian Environment.

Review of Activities 1981-1982; 1982-1983. (Includes: A Perspective on the Canadian Environmental Advisory Council; Resolutions of the 1981 Assembly of Environment Councils of Canada).

Review of Activities 1983-1984. (Includes: A Submission to the Royal Commission on the Economic Union and Development Prospects for Canada; Acceptable Risk; Assessing Proposals for a Canadian Pesticides Advisory Board; Completion of the National Park System in the North; The Key to the Future).

Review of Activities 1984-1985. (Includes: Guidelines on Conflict of Interest Situations; The Central Council for Environmental Protection in the Netherlands; Canadian Agricultural Land Base: Quantity and Quality).

Review of Activities 1985-86; 1986-87. (Includes: Ethics and Environment; A View Towards 2005 — Future Environmental Trends and Issues).

CANADA AND SUSTAINABLE DEVELOPMENT

Executive Summary

The publication of *Our Common World* by the World Commission on Environment and Development (WCED) is an important opportunity for Canadian policy-makers to focus their attention on the environmental concepts and principles which form the continuing basis of all human social and economic activity. The WCED's recommendation for a global effort to achieve sustainable development should stimulate action to strengthen Canadian environmental protection measures and management procedures.

The way in which Canada responds to the WCED will be particularly important because this country took the lead at an early stage in encouraging international recognition of environmental concerns. The degree of seriousness with which Canada pursues sustainable development in the domestic context will significantly affect its credibility abroad and consequently its ability to promote the adoption of improved environmental and resource management practices elsewhere.

CEAC agrees with the WCED that improved practices are essential, because environmental deterioration and resource depletion are now proceeding on a global scale and at an accelerated pace, with adverse consequences for all countries. Threats to human health and national security are becoming increasingly evident and economic dislocation can be expected.

CEAC believes that Canada's reaction to *Our Common Future* should be focussed on three areas of long-term environmental interest. It should, however, be emphasized at the outset that, in making its recommendations, CEAC is mindful of the immediate economic and social problems of developing nations as described by the WCED. The focus it has chosen is determined by its responsibilities as an advisory body and the particular standpoint which those responsibilities make possible.

Attitudes to the Environment: Sustainable development will not be realized if there is no change in the popular perception of the natural environment as a limitless storehouse of wealth for human consumption. What is required is nothing short of an alteration of mindset.

Recognition of the ecosphere as the home of humankind, and of other species, operating in accordance with its own integral processes, should be encouraged through comprehensive public education measures. These might include curriculum development for schools, adult

information programmes of all kinds, and environmental management training for public servants and private sector employees. A "Decade of the Environment", if appropriately planned and financed, could contribute significantly to greater public awareness of sustainable development.

As a means of directing political attention to sustainable development issues, CEAC urges that a series of conferences and meetings be organized. We recommend:

- a televised two-day national summit on the economy and the environment;
- a circumpolar conference on arctic marine, wildlife and environmental management, hosted by Canada;
- active Canadian participation in a global conference on sustainable development.

Information and Environmental Analysis: There is a need for understanding of the environment and man's interaction with it, based on both natural and social sciences. This is the essential foundation for all aspects of effective environmental management — from resource allocation to compliance mechanisms.

Research in environmental science and related areas of the social sciences should be characterized by continuity, international compatibility, and promising interdisciplinary approaches. Strategic grants for environmental research would be highly desirable. Recent initiatives in state-of-the-environment reporting should be encouraged, and particular attention must be devoted to the demanding task of integrating environmental understanding into the process of government policy-making and follow-up monitoring. As CEAC has stated elsewhere, comparative data, both on environmental standards and regulations and on management programmes, must be accumulated and used for the purpose of defining effective avenues for legislative development.

Environmental principles must be incorporated into all aspects of government policy, including trade, regional development and foreign relations. To this end, research into economy/environment linkages will be necessary and it should be facilitated by strengthening the economic analysis capability of the Department of the Environment.

<u>Institutions</u>: Within government and industry, organizational re-structuring is required to ensure that all agencies

Note: This is an extract from a report prepared and published by the Council in December 1987.

undertaking economic development projects assume responsibility for the environment at the earliest stages. The addition of the Minister of the Environment to the Priorities and Planning Committee of the Cabinet would be useful in this respect.

If the widely supported concept of trust obligations to future generations is to influence contemporary conduct, structural innovations in government will be required. It is essential to establish procedures of surveillance and independent review so that present governments can be held accountable for the consequences of their programmes and policies. The creation of an Environmental Council for Canada, or possibly the appointment of an auditor general for the environment, appear to offer means of strengthening accountability.

Through the UN and its agencies, and through the medium of bilateral and multilateral negotiations, Canada — as a middle power with a long-term interest in better environmental management on a global scale — should work to further the principles of sustainable development. The introduction of environmental assessment into Canada's international assistance programmes is a worthwhile initiative in this regard.

In summary, for the purpose of achieving sustainable development in Canada, CEAC recommends an extended federal and provincial programme, which might take the form of a "Decade of the Environment", incorporating the following initiatives:

- strategic grants for environmental research and

- continued efforts to refine, and make better use of state-of-the-environment reporting;
- comprehensive curriculum and public education measures designed to raise general awareness of the principle of sustainable development;
- a national summit on the economy and the environment, a circumpolar conference on arctic environmental management, and active Canadian participation in a global conference on sustainable development;
- the development of an economic analysis capability within Environment Canada and the addition of the Minister of the Environment to the Priorities and Planning Committee of the federal Cabinet, together with equivalent measures in the provincial sphere;
- incorporation of environmental principles into all aspects of government policy including trade, regional development and foreign relations;
- implementation of structural changes to ensure the accountability of federal and provincial governments for the environmental consequences of their programmes and policies;
- continuing efforts to encourage the adoption of longterm environmental management principles by other countries, including countries receiving Canadian international assistance.

PREPARING FOR THE 1990s: ENVIRONMENTAL ASSESSMENT, AN INTEGRAL PART OF DECISION MAKING

Executive Summary

This review has been carried out within the context of recent national and international developments which point to the close linkages between the environment and social and economic planning. Environmental assessment is a key tool in both planning and management. In preparing for the 1990s, the Government of Canada has an important leadership role to play, and a major strengthening of the existing Environmental Assessment and Review Process would contribute significantly to the goal of sustainable development.

This report contains a large number of recommendations which will substantially alter the present Process while retaining many of its features. Among the key changes that are proposed are:

- the development of specific environmental assessment legislation covering proposals for which the Government of Canada has the decision making responsibility;
- applicability of the Process to all departments, boards, agencies, crown corporations and regulatory bodies without qualification;
- retention of the principle of self-assessment, but subject to audit and override provisions;
- development and public review of screening criteria;
- environmental assessment procedures for dealing with site-specific projects detailed in regulations;
- a new high level environmental review mechanism for policy/program consideration;
- provision for alternative conflict resolution mechanisms;
- greater opportunity for public involvement at various stages of the Process, including provision for appeals

to the Minister of the Environment for a more extensive review;

- greater responsibility for the Minister of the Environment including authority to initiate environmental impact assessments in certain circumstances:
- a requirement to negotiate interjurisdictional agreements to minimize unnecessary duplication;
- provision for formal hearing procedures, while preferring informal hearings as the norm;
- greater emphasis on post-implementation monitoring and feedback:
- strengthening bilateral aid policy to meet Canadian concerns about possible global environmental degradation;
- encouragement for the conduct of collaborative regional planning exercises to determine the extent of existing environmental stress and the ecological characteristics most susceptible to environmental disturbance in various parts of the country;
- support for intervenor funding by the proponent with funds administered by a small independent committee.

Acceptance and implementation of the recommendations in this report will require concomitant commitment of resources in both initiating departments and in the office responsible for the administration of the reformed Process.

In order to better visualize the overall Process as recommended, the report includes as Annex 7 a summary description of the reformed Process along with a diagram showing the entire flow from beginning to end.

LISTING TOXICS UNDER CEPA — IS THE CHEMISTRY RIGHT?

Executive Summary

This report discusses the development of priority chemical lists for regulation under CEPA, and as such provides information that may be of use to those designing such lists, including in particular the Priority Substances Advisory Panel. However, assessment and regulation under CEPA will not be effective if based solely on single-chemical lists; this report also discusses the need to incorporate bioassessment into the regulations in the form of toxicological testing of chemicals, substances and environmental media of concern.

This report contains a number of recommendations; key among them are:

- The List, the related selection criteria and the assessment process must be subject to peer review, and be technically defensible. As well, the technical validity of how the List is used must be clear.
- The List of toxic chemicals must be criteria driven, and include a mechanism to add or remove compounds as appropriate;
- Broad-scale approaches to substance listings (i.e. including mixtures, emissions and effluents) must be realistic and based on measurable parameters;
- Possible environmental problems such as electromagnetic radiation which are not substances and are thus not included under CEPA need to be evaluated for inclusion;

- Certain classes of hazardous substances are treated by specific legislation outside of CEPA, and each province has its own environmental legislation. CEPA must have overriding authority in cases where legislation and regulation are not at least equivalent to CEPA.
- There may be organizational problems within and among the Departments involved in CEPA; strong integrative activities are required to ensure smooth working interrelationships.
- Actions to be taken after the Toxic Substances Advisory Panel produces its List must be defined and the appropriate level of scientific and administrative expertise must be assigned to support CEPA;
- The credibility of CEPA depends on rapid action; at present, projections of time required to assess substances prior to their regulation are not appropriate to the challenge;
- The effectiveness of CEPA requires periodic assessment to determine whether the pollution level in Canada is decreasing, increasing or holding steady;
- The Brundtland Commission's recommendations (economy-environment linkages involving sustainable development) must be an integral part of CEPA and of regulations promulgated under CEPA.

PCBs: A BURNING ISSUE

Background and Overview

A broad appreciation of the nature of the "PCB problem" and the way in which the public views this issue is essential since the siting of hazardous waste destruction facilities, such as PCB incinerators, is primarily a social process, rather than solely a technological process. Therefore, this report does not deal with environmental and technical matters in isolation, but as they relate to the social aspects of the siting process.

It is common knowledge that PCBs have been in commercial use since 1929 in a variety of industrial applications. However, their widespread and uncontrolled use has led to extensive and persistent contamination of the environment, especially when they have been stored in an inadequate fashion. Today, the distribution of these chemicals appears to be global, even impacting isolated Arctic settlements and contaminating the food chain. There are compelling reasons for completely phasing out the use of PCBs and ensuring their permanent disposal as expeditiously as possible, consistent with safe storage and transportation. The Council's major concern is to minimize further escape of PCBs into the air, water, or soil.

Public concern over PCBs is conditioned both by specific events and by the more general fear of toxic chemicals. Specific events in which public health and safety have been threatened, or when environmental contamination has occurred, include:

- The "Yusho" incident in Japan in 1968 when more than 1,500 people were affected by rice oil contaminated by PCBs.
- Evidence in the 1970s of elevated levels of PCBs in fish and fish-eating birds and mammals in the Great Lakes ecosystem.
- The "Kenora" spill of PCBs on the Trans-Canada Highway in Ontario in April 1985.
- The "Smithville" situation in Ontario in which extensive contamination of soil and groundwater resulted from improper storage of PCB wastes.
- The "St. Basile-le-Grand" fire at a warehouse in Quebec in August 1988.

These events demonstrate to the public the inadequacies of past PCB management practices, despite twenty years of

regulatory actions by governments, including restrictions on PCB use since 1978, and additional restrictions on PCB use, sale and transportation in 1980 and 1985. Also, in 1985 the Canadian Council of Resource and Environment Ministers developed a national plan to eliminate PCBs from the Canadian environment. However, problems have continued to occur, leading to the latest round of regulations in 1988 and 1989.

Frequent inspections and the vigorous enforcement of PCB regulations and standards have been promised by all levels of government in reaction to the St. Basile fire. This is a critical part of the overall PCB management program since past "disasters" are largely attributable to regulatory failures. Governments in Canada can no longer avoid committing the necessary resources and political will to ensure that inspection and enforcement actions are effective.

It is clear that federal-provincial cooperation is the cornerstone of a comprehensive and effective approach to managing PCBs and other toxic chemicals. Despite the series of events which have propelled the PCB issue into public prominence, it is still not clear to the public or to the Council the extent to which such cooperation is occurring. The work of the Canadian Council of Resource and Environment Ministers to integrate provincial efforts with the federal initiative appears to be developing slowly but with some resistance. There is a strong onus on the federal government to consult closely with the provinces on this initiative and, commensurately, for the provinces to cooperate effectively with the federal government. The whole PCB initiative must be built on a solid foundation of federal-provincial cooperation and a concerted effort to build public trust.

PCBs can also be viewed as an indicator of the general public fear of chemicals. People are alarmed over inadequate waste management efforts by industry and governments. Due to past problems and federal and provincial regulatory failures, the public now mistrusts governments, industry, technology and technocrats. The public has also been left with a number of misconceptions and misunderstandings on the nature of chemicals and the ways in which they can be safely managed. The federal effort to find sites for a mobile PCB incinerator will be strongly influenced by public fear and mistrust.

From a purely technical point of view, there is an incentive

to incinerate PCBs. Technologies exist which can destroy PCBs at destruction and removal efficiencies of 99.9999% or greater. At this efficiency level, there will be more risk of release of PCBs to the environment from current storage and handling practices than from incineration. Thus, the longer term environmental and public health risks of inaction on PCB disposal outweigh the risks of incineration. The most immediate need is to ensure proper storage and handling of PCB wastes to prevent accidental releases to the environment while destruction facilities are being put in place. The phase-out of PCBs from active use over the next five years will result in additional storage and handling risks if disposal facilities are not in place to ensure their rapid destruction. Therefore, an integrated and comprehensive approach to this issue is required to minimize environmental and human health risks while ensuring the cost-effective and timely phase-out and destruction of PCBs in Canada.

Despite the scientific logic supporting rapid implementation of the destruction program, there are sound reasons for proceeding cautiously to allow for public input. Each of the provincial processes has aroused more public concern and taken more time than originally estimated. In the case of British Columbia, the siting process collapsed even though it previously appeared to have achieved local approval. Siting process failures have occurred in other provinces for many reasons, including the failure to separate the proponent and regulator roles, and moving too quickly on siting initiatives before proper regulations and standards were in place. The high level of public concern generated by the provincial siting efforts for permanent facilities will undoubtedly reappear when the federal process is announced for the use of transportable or mobile technology. The issues go far beyond technical feasibility to encompass a whole range of concerns involving health, safety, community impacts, ongoing liability and the environment.

ON ENVIRONMENT AND ECONOMY

Towards Sustainable Economic Development

The economy and its participants exist within the environment, not outside it; we cannot expect to maintain economic prosperity unless we protect the environment and our resource base, the building blocks of development. Correspondingly, economic growth and prosperity provide us with the capability to support wise resource management and protect environmental quality. For this reason, we support the goal of sustainable economic development, which we generally define as development which ensures that the utilization of resources and the environment today does not damage prospects for their use by future generations.

At the core of the concept of sustainable development is the requirement that current practices should not diminish the possibility of maintaining or improving living standards in the future. This means that our economic systems should be managed to maintain or improve our resource and environmental base so that the generations that follow will be able to live equally well or better. Sustainable economic development does not require the preservation of the current stock of natural resources or any particular mix of human, physical and natural assets. Nor does it place artificial limits on economic growth, provided that such growth is both economically and environmentally sustainable. Sustainable economic development implies that resources and the environment must be managed for the long-term, taking into account their possible value in the future as well as their value now.

Governments and industry have reacted to correct many of the problems created by past mismanagement of the environment. Sustainable economic development calls for a different approach. It would minimize environmental impact and future clean-up costs by advanced and integrated planning. In a phrase, the remedial, reactive approach would be replaced by "anticipate and prevent" as the dominant concept underlying environment-economy integration.

The political and economic structures of Canada and the world are awakening to the need to make economic development sustainable. Decision making has not yet adapted to fulfill this need. Change is necessary, and it must occur now.

Efforts have been made in Canada to achieve sustainable economic development. The greatest weakness in these efforts has been the sectoral approach to planning and development. This too is starting to change, but the process must be accelerated. Governments increasingly recognize that they hold resources in trust for both present and future generations. Industry is increasingly working towards long-term environmental solutions. Limited progress to date by all sectors is a reflection of the complexity of the problems and of structural limitations in our economic, social and political systems.

The goal of sustainable economic development cannot be attained without significant change in the way our economic initiatives are planned and supervised. This makes it a challenging goal, even more so in the Canadian context because it will require different approaches in various economic sectors and political jurisdictions across the nation, although the same underlying principles should apply to every jurisdiction.

SUSTAINABLE REDEVELOPMENT: FOCUS FOR THE UNIVERSITY

by J. Stan Rowe

Change to be useful, said Hilda Neatby, must always be in harmony with some fundamental belief and some primary purpose consistent with that belief. The evolution of the University during its first 80 years was guided by beliefs and purposes appropriate to those times but less sure today, suggesting that useful change must henceforth be anchored to somewhat different beliefs and purposes. If the University's objective is to develop "a set of principles which collectively will form a statement of mission to guide the University as it adapts to a changing environment while preserving the best traditions from its past" (Issues and Options Discussion Paper, University of Saskatchewan, Summer 1986), then its foremost task along with critical reexamination of traditional values is identification of emerging new global beliefs and purposes.

When the University of Saskatchewan was established in the early years of this century, its beliefs and purposes were unquestioned. Assured of certain certainties, the President's vision of the University's sphere was unblurred; it was to be "service of the state in the things that make for happiness and virtue as well as in the things that make for wealth ... [and] advancement of learning" (President's Report 1908-1909). Merely to repeat the same clarion call for "service" (as vague and uninspiring as exhortations "to pursue excellence") stirs no rapid heart beat today.

Precisely those things that President Walter Murray took for granted need to be questioned. How can the University best serve the state? And what about service to the global community? What goals will be conducive to happiness and virtue for citizens of the world? Are we assured that the meaning of wealth and those things that it comprises are fully understood? Are there some kinds of learning that ought not be advanced? Does all technological innovation constitute "progress"?

In September 1987 the World Commission on Environment and Development (WCED) reported to the United Nations General Assembly that Earth's ability to support life is being seriously threatened by the influence of humanity. It indicated that ecology and the economics of human development "are becoming ever more interwoven — locally, regionally, and globally — into a seamless network of causes and effects". The Commission issued a call to "people of all countries and all walks of life to move quickly in restructuring national and international policies and institutions in order to foster the sustainability of social and economic development" (sustainable development). In this

the WCED echoes the concern within the international scientific community that the very basics of the natural planetary systems that allow life to exist on Earth are being altered by human activities. These changes are unprecedented and appear to be escalating in magnitude. What is not often mentioned is that they are the fruits of these very beliefs and purposes subscribed to in Western culture, that motivated and directed the University of Saskatchewan in its younger years.

The idea is by no means new that the world, and human society in it, should be sustained. The urgency of taking the truism to heart, however, arises from the insight that Western culture has inadvertently set itself on the dead-end path of nonsustainability. To find a new direction is a difficult challenge. It involves reappraisal of dogmatic beliefs woven into the very fabric of culture about humanity's place in nature and about the roles of social institutions, especially educational institutions that the public views in a leadership role.

Sustainable development means the kind of economic development that can continue indefinitely without reducing the potentialities for replenishment and renewal of the global ecological system — the ecosphere. In one respect "sustainable development" is an unfortunate phrase, for by naming economic development as the goal of sustension rather than the ecosphere or world environment (without which no life, no human economy could exist), it weakens the essential message: the carrying capacities of the Earth's land and water ecosystems, based on their cyclic replenishment and renewal, must take precedence over the reproductive and exploitive proclivities of the human species. To escape the implication that tinkering with the current system is sufficient to perpetuate traditional development, the phrase "sustainable redevelopment" is preferred. It suggests a rethinking of development in the context of a sustained environment. Thus understood, it can also be read as "ecodevelopment," a word introduced by Maurice Strong at the 1972 Stockholm Conference on the Human Environment to emphasize the kind of careful symbiotic human activities that respect the ecosphere and are not disruptive of it.

To sustain means also to nourish and maintain in health. All human endeavours that keep the ecosphere and its regional ecosystems healthy will serve sustainability while contributing to the health of organisms (including humans) within them. The concept of health as a goal, interpreted

Note:

This is an abridged version of an essay prepared by one of the Council's vice-chairpersons. It was prompted by the Council's work on sustainable development, and was originally intended for discussion among the faculty of the University of Saskatchewan.

not only at the level of the individual but also at the more encompassing levels of society in its built environment, and of the sectoral ecosystems that the global ecosphere comprises, provides an integrating focus for education at all levels.

As an institution of reflective inquiry, the University is searching for its new role in society, for a new definition of its mission. But the University is fragmented, departmentalized, divided by labels into various subcultures: the Arts and the Sciences, the educators in "liberal" colleges versus those in "professional" colleges, the scholars and the researchers, the practitioners and the theoreticians. Nevertheless all share the same general culture, the same world-view, and are motivated by common values, beliefs and purposes. The University's first task is self-education, to make faculty aware of its shared Weltanschauung as the necessary point of departure for directional change that will require everyone's participation.

To anticipate-and-prevent is a better strategy than react-and-cure. The latter is patently unsuited to global threats such as nuclear war. Nevertheless most social effort is directed to cures, after the damage is done. Medicine is a good example. Deterioration of the health of the ecosphere, of ecosystems, organisms, and people, is an ever-growing source of scientific activity. It is no accident that scientists are first off the mark with global programs such as the International Geosphere-Biosphere Program (IGBP) while other sectors of society (and other sectors of the University) straggle along behind.

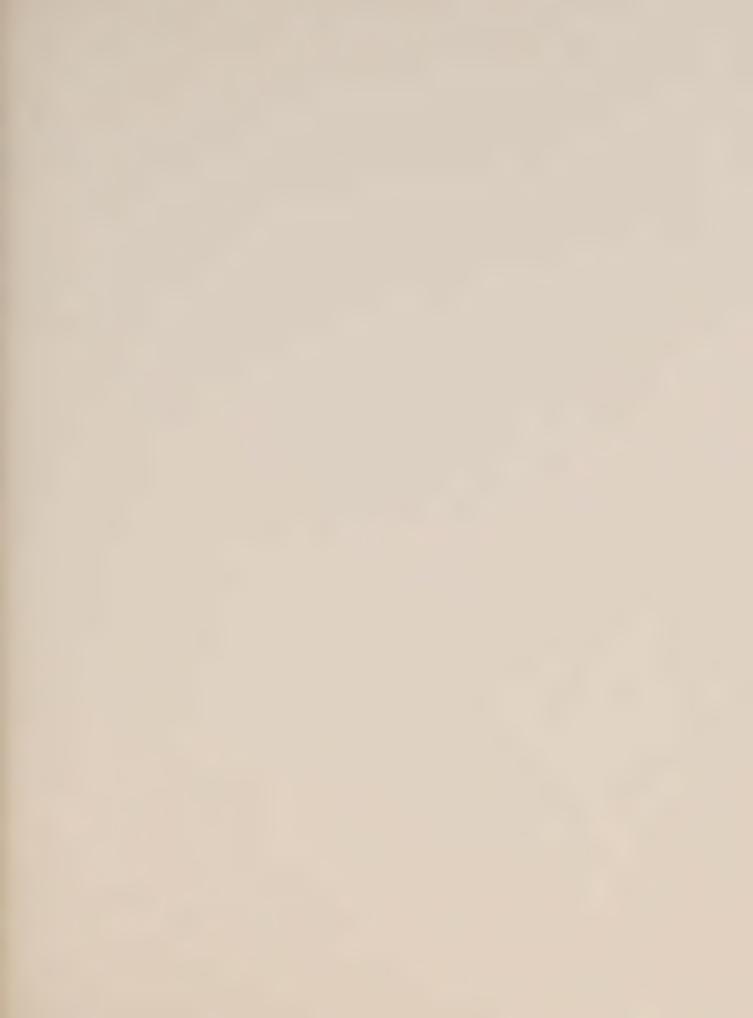
To anticipate-and-prevent is the more difficult task because its realm is ideas, values, emotions — the springs of human

action. Using again the example of nuclear war, no scientific nor technological solution exists for it; prevention must come from political will, based on attitudes that attach higher importance to the planet and humanity than to chauvinism. Thus the chief province of anticipate-andprevent is with the liberal Arts and the Social Sciences. The Natural Sciences are adept at identifying the ozone holes over the poles (caused by an earlier generation of scientists/technicians playing around with CFCs) and, after the fact, at prescribing possible cures. The Social Sciences and the Humanities are equally important, commanding the terrain in which social values are rooted, acquainted with the imperatives that drive the cultural system, perhaps able to identify those that require change if further monumental insults to the life-giving capacity of the Earth are to be avoided.

In short, "sustainable redevelopment" as a societal goal can involve all disciplines. It necessarily subjects to scrutiny western culture in its entirety, including the values and beliefs inherited from a 3,000-year humanistic tradition. For the environmental and social problems smiting the world are not freak accidents nor passing afflictions that can be waited out. They are clear danger signals, indicators of wrong actions based on faulty ideas. Events are shouting at humans to reexamine traditional values and attitudes, to search out new answers to the profound questions: Who in the World do you think you are, and What in the World are you doing? Both the theoretic and applied Arts and Sciences are on the dock, challenged to answer and to justify their answers.

April, 1988







1989-90

Canadian

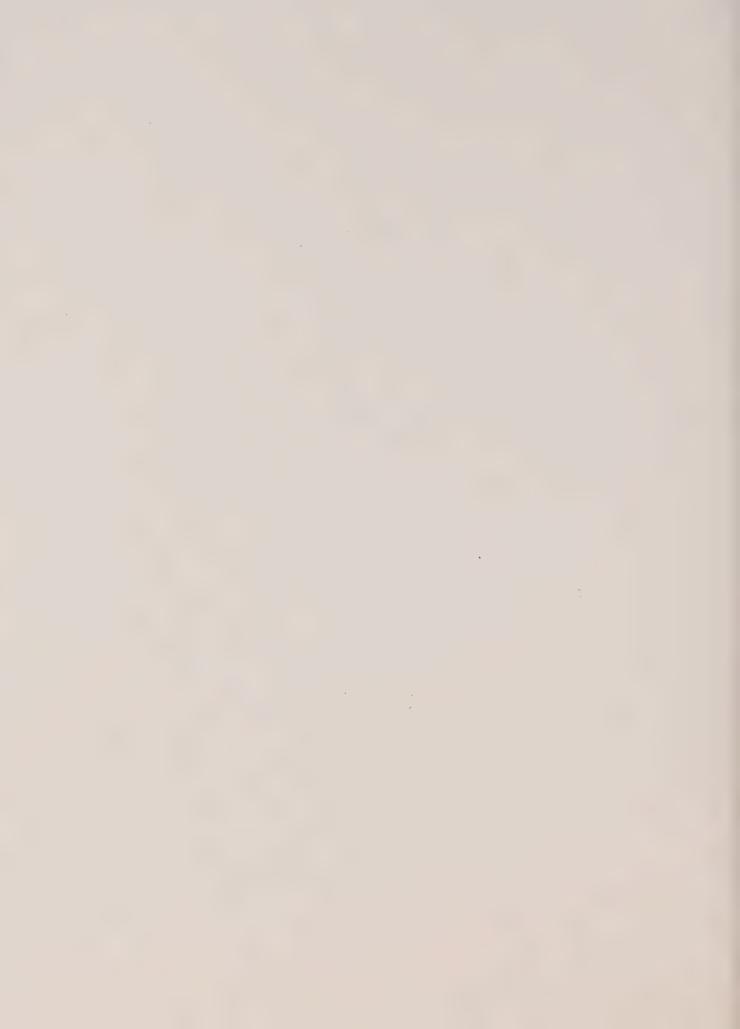
Environmental

Advisory

Council

REVIEW OF ACTIVITIES





Canadian Environmental

Advisory Council

Enquiries concerning the work of the Council and requests for Council publications should be addressed to:

The Executive Director Canadian Environmental Advisory Council c/o Environment Canada Ottawa, Canada K1A 0H3

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council (CEAC) is a body representing a cross-section of Canadians who are knowledgeable and concerned about the environment. It operates in a confidential advisory capacity to the federal Minister of the Environment. It provides the Minister with an alternative to the advice provided by the Department of the Environment (Environment Canada) and other federal agencies, and to the advice of specific interest groups. The Council's public role, in terms of activities such as the publishing of reports, is secondary to its primary function of providing advice to the Minister of the Environment.

Ottawa, Canada K1A 0H3

Minister of the Environment Ottawa, Canada

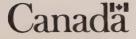
Dear Minister:

It is with great pleasure that I submit to you the Council's Review of Activities for the period 1 April 1989 to 31 March 1990. The Council was very active during this period, particularly with respect to commenting on the legislation for the Environmental Assessment and Review Process. Major projects on the subjects of protected areas and sustainable development indicators were initiated and will be completed in 1991.

On behalf of all Council members, I would like to convey our best wishes and our commitment to future service.

Sincerely,

Dr. Robert Page Chairman



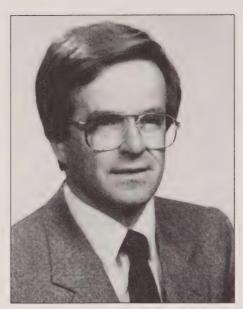
CHAIRMAN'S REMARKS

Those who follow the activities of the Canadian Environmental Advisory Council will observe a distinct change in presentation and format in the 1989-90 Review of Activities. A new cover design has been adopted, and the Review has been oriented toward a more reflective and thought-provoking style, including a new section on "Features" written by Council members, past and present. The Review opens with "Chairman's Remarks" which provide an overview of Council activities during the year in question.

During the period from 1 April 1989 to 31 March 1990 the Council played an active advisory role. The federal initiative to legislate the Environmental Assessment and Review Process (EARP) and to commence work on a

national "Environmental Agenda" (or Green Plan as it later came to be called) created much work for the Council in terms of advice to the Minister and the Department of the Environment. In particular, the Council prepared advice on EARP issues such as the equivalency of federal and provincial processes, the self-assessment principle, policy assessment, intervenor funding, post-implementation monitoring, and the follow-up audit of panel recommendations. Advice was also given on the public consultation process for the Green Plan, with a recommendation made to carefully monitor the process and view it as a learning experience as well as a mechanism for obtaining public input.

Following a meeting with The Honourable Lucien Bouchard in July 1989, the Council initiated three studies. A major study on protected areas in Canada was launched with the premise that Canadians strongly support the protection of unique and



Robert Page, Chairman

representative wilderness areas and landscapes. Work was done in 1989-90 on developing a national protected areas vision and action plan, with publication planned for early 1991. A second major study was commenced on indicators of ecologically sustainable development. This study follows earlier Council reports on Examining Environment-Economy Linkages (1986) and Canada and Sustainable Development (1987). The publication of three reports on indicators is planned for 1991. A third study, on the subject of the environmental and health impacts of energy production and use, was initiated after an extensive preliminary review by Council members. The Council lacked the resources required to cover this subject in depth, so it narrowed the study to focus on the

impacts of the nuclear industry. This work also proved to be very large in scope, and the Council extended the deadline for the production of its report. Publication is planned for 1991 following peer review of the findings. The Council last examined the nuclear industry in 1977, in a report titled Environmental Aspects of Nuclear Power Development in Canada.

All in all, the Council has tackled a large agenda, and intends to maintain an active advisory role to the Minister as well as continue to serve the public through the publication of the results of its research. It goes without saying that the environment has moved to the upper level of the policy agenda of governments across Canada, and the challenge of integrated decision-making in governments will increase the stress on bureaucratic and political decision-making structures and processes.

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COUNCIL OPERATIONS

This section of the Review describes Council operations. The Council is a voluntary organization with part-time members who carry out work with the support of a small permanent secretariat staff. Much of the business of the Council is conducted through meetings and by various forms of telecommunications.

Meetings

During 1989-90 the Council made frequent use of small groups or committees of members who were assigned responsibility for individual studies. These groups occasionally met informally, but their progress reviews and discussions were generally combined with regular meetings of the Council. There were seven meetings of the full Council during the year, and four meetings of the Executive Committee. In addition, there was one special meeting of members with the Minister of the Environment to establish priorities for the year.

The practice of holding meetings in various parts of the country to gain first-hand knowledge of local and regional environmental conditions and issues was continued. Of the eleven formal meetings of the Council and Executive, only four were held in Ottawa-Hull. The locations of other meetings included Yellowknife, Toronto, Burlington, Winnipeg, Halifax, and Vancouver. The meeting in Halifax was scheduled to coincide with the annual Assembly of Environment Councils of Canada. The meeting in Yellowknife was noteworthy as the first full meeting of the Council held in the Northwest Territories.

Several of the meetings involved special briefings designed to keep the Council abreast of developments in the environmental field. Briefings of particular interest included: by the Angus Reid Group regarding research on public environmental concerns expressed in opinion polls; by officials of Environment Canada on the role of the Office of the Science Advisor; by the Canadian Wildlife Service on the National Wildlife Research Centre; and by a Council Vice-chairperson on progress made by the World Bank and the Asian Development Bank toward incorporating environmental considerations in their decision-making processes.

The Chairman of the Council met with leaders of the Natural Resources Defence Council in Washington for discussions on the Clean Air Act (USA) and a variety of transboundary issues. A meeting was also held with the Chairman of the House of Commons Environment Committee to exchange views and brief him on the work of the Council.

Conferences

Council members and staff participated in several conferences and workshops during the year, either as participants at the request of the sponsors or to exchange views and information. Included were: the Symposium on Arctic and Global Change in Ottawa; the Conference on the Environment and the Economy in Winnipeg; the Globe 90 Conference in Vancouver; the Federal-Provincial Wildlife Conference in St. John's; the Conference on Law and Sustainable Development in Ottawa; and the Conference on Health-Environment-Economy in Toronto. In addition, the Executive Director of the Council served as one of three Canadian experts at the workshop on Sustainable Industrial Activity in Warsaw (Poland) in preparation for the Economic Commission for Europe's Action for a Common Future Conference in Bergen (Norway).

Membership

The Council continued to operate below its membership limit of 16 during 1989-90. For reasons of economy and flexibility, the Council has normally operated with 8 to 12 members. There were 11 members at the start of the year, but with two retirements the total dropped to 9 by year-end.

The following members completed their terms during the year:

Dr. J. Stan Rowe (Vice-chairperson) University of Saskatchewan Saskatoon, Saskatchewan

Mr. Murray Coolican National Sea Products Halifax, Nova Scotia

No new appointments were made during the year, although several were under consideration at year-end. Dr. Robert Page was re-appointed as Chairman; and Dr. Hélène Connor-Lajambe was nominated as a Vice-chairperson to fill the vacancy created by Dr. Rowe's retirement. A complete list of members as of 31 March 1990 appears in this Review as Annex A.

Publications

As noted in previous Reviews, most of the issues studied by the Council result in advice which is provided to the Minister either orally or by letter. Only a few of the Council's activities include the production of formal reports. The Council published two reports during 1989-90:

Land Use Planning and Sustainable Development in Canada

This report concluded one of the Council's major studies in support of sustainable development. A brief description of the study appears in the Council Studies and Advice portion of this Review, and an extract from the report is included as Annex C.

On The Role of Environmental Councils, In Relation to the Canadian Environmental Advisory Council

An examination of the Council's role was undertaken on a more-or-less continuing basis over a period of years. This report is the final output from that examination. It reviews various studies and commentaries on different kinds of councils and their characteristics. It is intended as a reference for future planning purposes by the federal and provincial governments. An extract from the report appears in this Review as Annex D.

The third document published by the Council during the year was the *Review of Activities* 1987-88, 1988-89. That Review covered a two-year period as part of an effort to bring the Council's publication program up-to-date.

A complete list of the Council's publications appears in this Review as Annex B.

Administration

The Council began to resolve its budgetary problems during 1989-90. The Council has had problems in the past with funding its basic operations, while special funding had to be arranged for major studies and other projects. By year-end there were indications that the Council's annual budget would be stabilized at a significantly higher level to ensure that the Council could continue to plan and carry out its program of studies in an independent fashion.

The Council operated with the support of only two full-time staff until late in 1988 when a third position was provided. It was filled with the appointment of Mrs. Anne Marie Crevier as secretary. By the end of 1989-90 a fourth position had been transferred to the Council, and recruiting was underway. In January 1990, Mr. Joseph Potvin was seconded to the Council from the Corporate Policy Group of Environment Canada to assist in the study on sustainable development indicators. Also, during the year Mr. Ken Ogilvie was appointed Executive Director; he had previously been serving on an acting basis.

Staff activities continued to focus on the organization of meetings of the Council and its Executive and working groups, researching and gathering information on subjects under active study by the Council, editing reports, managing contracts, and performing other administrative support functions. The staff workload was heavy during the year due to an increased number of major studies and the need to plan for a scheduled move of the Council office to a new location in Ottawa.

COUNCIL STUDIES AND ADVICE

This section of the Review describes the major activities of the Council during the year 1 April 1989 to 31 March 1990. While the projects are described under separate headings, they are linked at various conceptual and practical levels. The Council approaches environmental issues as multisectoral and multi-disciplinary in nature; hence, linkages between and among Council reports and activities are important considerations.

A Protected Areas Vision for Canada

In past years the Council completed several studies on protected areas, and provided advice to the Minister. These studies focussed primarily on national parks – the Parks Act and policies, the national parks system, and proposals for new parks. During 1989-90 the Council directed its attention to the full range of protected areas, including ecological reserves, parks, and other protected area designations. This shift was prompted by the observation that the rate of land allocations and resource commitments would, by the year 2000, make the designation of new areas difficult if not impossible.

The existing approach to the establishment of protected areas has depended upon a variety of public and private bodies, and reflects changing value systems. Increasingly, there have been conflicts over the loss of wilderness areas and valued ecological assets such as old growth forests. Prompted by these observations, and with the encouragement of the Minister, the Council initiated a major study on "A Protected Areas Vision for Canada". The study was underway at 1989-90 year-end, and scheduled for completion in 1990-91.

The study, as noted, is not limited to national parks. The emphasis is on natural areas, including representative and unique wilderness ecosystems for which strict protective measures are needed. These might be designated as parks, wilderness areas, natural areas, ecological reserves, migratory bird sanctuaries, and so on, as long as adequate protective measures are assured. The Council's objective is to develop a vision and action plan which can be shared by public and private bodies so that the efforts of all will be complementary.

The study work plan includes consultations with interested organizations, individuals and government officials. The Council's project is also designed to build upon other studies, including the report of the Task Force on Parks Establishment, Parks 2000: Vision for the 21st Century (1987).

Sustainable Development Indicators

"We ask the OECD, within the context of its work in integrating environment and economic decision-making, to examine how selected environmental indicators could be developed."

The above excerpt from the Economic Declaration of the Group of Seven (G7) Economic Summit in Paris, July 1989, prompted the Council to conduct an in-depth study of a process for defining indicators of ecologically sustainable development. Canada played a key role in prompting the G7 Summit Leaders to support this initiative, and the Council was asked by the Minister to explore the issue in depth. The Council's interest and activity in the field of environmental indicators dates back to the mid-1970s, and in recent years was focussed on state of the environment reporting and the need for improved indicators for that purpose. The publication of Our Common Future, the report of the World Commission on Environment and Development (WCED), and the general acceptance of its concept of "sustainable development", emphasized the need for additional indicators that are neither purely economic nor purely environmental, but that provide linkages between the two.

The Council has been a strong advocate of the work of the WCED. It has undertaken studies on the concept of sustainable development, and has continued its support for the "round tables on environment and economy" established by the federal, provincial and territorial governments to advise on the definition and implementation of sustainable development.

In 1989-90 the Council reviewed work completed or underway in Canada and other countries on the subject of indicators, and met with organizations and agencies that were interested and knowledgeable in the field. By the end of the year, plans were underway for an international workshop to be held early in July 1990. Representatives of various schools of thought in economics and ecology, and senior policy and decision-makers from the public and private sectors were invited to attend. Three background papers were commissioned and were under preparation at the end of the 1989-90 fiscal year.

The Environmental and Health Impacts of the Nuclear Industry

There was a brief reference in the previous Review of Activities to the Council's involvement with, and reaction to the report of the Advisory Committee on Energy Options. The Review noted that "there is no issue more central to sustainable development than the relationship between energy policy and the environment", and commented that the Council was considering its future course of action, including the possibility of an in-depth study on how sustainable development concepts could be integrated into the energy policy framework.

Discussions on alternative courses of action continued during the early part of 1989-90. The Council developed a framework that, it was hoped, would be a useful contribution to the long-term national environmental agenda. It would require a series of individual studies that, in total, would be beyond the resources of the Council. The Council decided to undertake a study which it considered timely – The Environmental and Health Impacts of the Nuclear Industry. This study was intended to fit within the framework developed by the Council based on four points, each of which would require careful research, analysis and public debate:

- the amount of energy required for a quality society;
- assessment of current technologies;
- assessment of new technologies and technoeconomic practices; and
- risk assessment.

The Council concluded that it would be misleading to evaluate the present day environmental-social consequences of a particular energy source without also asking about its future, its dependability, and the kind of world into which it would be likely to lead society. It was considered essential to determine which energy technologies are conducive to sustainability of the ecosphere, and to undertake comparative evaluations.

The Council identified nuclear energy as its first priority for study. The increasing concern over climate change has led to renewed interest in the nuclear option, but the health and environmental risks associated with nuclear power must be carefully assessed before major decisions are made. A scientific review of the environmental and health impacts of nuclear energy was commissioned by the Council at year-end. In the Council's view, the scientific review should be part of a series of studies through which it would be possible to evaluate the sustainability of all major energy cycles and technologies. The nuclear industry study is intended to result in a balanced and comprehensive summary of what is currently known, and to identify key areas for public debate on the nuclear energy option and its place in Canada's overall energy mix. The Council plans to urge others to undertake

similar studies for all energy cycles, and might, within its own resource constraints, conduct further studies in this area.

Environmental Assessment and Review Process (EARP)

During the previous year, the Council undertook an independent review of the Environmental Assessment and Review Process. The report, *Preparing for the 1990s: Environmental Assessment, an Integral Part of Decision Making*, was completed and released near the end of the year. It contained recommendations for major changes, including the entrenchment of EARP in legislation. Throughout 1989-90 the Council was involved in extensive follow-up to its report, particularly with respect to preparing advice on the proposed legislation of EARP.

Problem areas were discussed with the Federal Environmental Assessment Review Office and Environment Canada, and with representatives of interested groups. The Council was also briefed by an expert in constitutional law. The Council then provided advice to the Minister on five main areas of concern: the equivalency of federal and provincial processes (as well as various federal decision-making processes); intervenor funding; post-implementation monitoring and the independent follow-up audit of panel recommendations; environmental assessment of policy; and self-assessment monitoring. The Council noted that public expectations were far in advance of the bureaucratic willingness to change, and only the application of political will could bring a satisfactory level of reform.

The majority of the recommendations made to the Minister were elaborations or refinements of recommendations made in the Council's 1988 report. The Council was particularly concerned about provisions for the equivalence of EARP and other assessment processes within the federal government and between the federal and provincial governments. The Council warned that if other federal agencies were allowed to operate independent processes that significantly undermined the principles of EARP, the credibility of the whole process would be in question. In the federal-provincial field, the Council's concern regarding equivalence between the federal and provincial assessment processes was increased by the Federal Court challenge on the Rafferty-Alameda dams.

The Council supported the recommendation of the National Task Force on Environment and Economy that called for the harmonization of environmental assessment processes across Canada, but the Council stressed that in most cases this would require upgrading of provincial processes, not downgrading of the federal process.

Of equal concern to the Council was the environmental assessment of policy. The Council recognized that the development of policy cannot be carried out completely in public, and that a balance must be found between secrecy and an open public process. It noted that the Brundtland Commission, which introduced the concept of sustainable development, focussed on policy formulation. The implications of the Commission's message were clear: there must be environmental assessment of policy if there is to be sustainable development, and the documentation on assessments must be open to public and parliamentary scrutiny.

The Green Plan

"The challenge is to integrate environmental considerations into decision-making in a more systematic, focussed and coordinated way. The government's first priority, therefore, is to help change the way decisions are made at all levels of society."

A Framework for Discussion on the Environment (1990)

Members of the Council were briefed by Environment Canada on the "framework document." It was described as a "national action plan for the environment which will address environmental issues of concern to Canadians and establish a framework for implementing sustainable development in Canada." After a revised document was approved in principle by the Cabinet, the Council was briefed by the Deputy Minister. The Council was asked for comments on the document itself and on plans for public consultation.

The latter briefing took place in March 1990, just prior to the end of the Council's fiscal year; therefore, most of the Council's activity on this subject was scheduled for the 1990-91 fiscal year. The Council did provide interim comments and suggestions to the Minister shortly after the briefing. The comments, while critical of plans for the consultation process in some respects, were oriented toward improvement of the process. The Council noted that "Nobody wants the agenda to fail. – From this it follows that the Green Plan cannot be allowed to fail."

The Council was concerned that public expectations were high and that the Green Plan would probably not measure up to those expectations. The Government was advised to be receptive to criticisms and suggestions during the consultations. The Council also urged that there be consistency across the country in terms of access to the consultations – all regions and groups should have an equal opportunity for influence.

Canadian Environmental Protection Act

Major efforts related to the Canadian Environmental Protection Act were undertaken by the Council in previous years. They included a study of the proposed legislation, which culminated in the publication of the report, *Review of the Proposed Environmental Protection Act* in March 1987, and a 1988 review of the process for developing lists of toxic chemicals under the Act. Recommendations on the latter aspect were incorporated in the Council report, *Listing Toxics Under CEPA – Is The Chemistry Right?*

Concern continued to be expressed by the Council over the ability of Environment Canada to do the necessary assessments on toxic chemcials. The Council recognized that there were enormous gaps in scientific understanding and that the scientific capabilities of Environment Canada staff were limited in terms of numbers and the required mix of skills. The Council urged again that the federal government seek assistance through co-operation with other countries, and that additional resources be allocated to Environment Canada to strengthen its analytical and research capabilities.

In the past, the Council has expressed concern to several ministers on the subject of enforcement and compliance. It published the results of one study in 1987, *Enforcement Practices of Environment Canada*. The Council cautioned the current Minister that effective and consistent enforcement is critical to federal government credibility with the public.

The Council brought two particular concerns to the attention of the Minister during the year, both of which were emphasized in previous studies: the need to speed up the process for scheduling (and ultimately regulating) toxic chemicals; and the enforcement of regulations under the Act, particularly in connection with federal-provincial administrative agreements.

Environmental Awards

The federal Minister of the Environment announced a new series of National Environmental Achievement Awards to be inaugurated in 1989, and asked the Council to make the final selection of winners. The awards were introduced to recognize "the achievements and dedication of Canadians in protecting and restoring the environment." The awards were offered in five categories:

1. Non-profit Organization – for a non-government, non-profit group that made an outstanding contribution to Canada's environment.

- 2. Outstanding Communications for Environmental Awareness for an author, journalist, broadcaster or film-maker whose work significantly increased Canadians' awareness of environmental issues.
- Corporate Environmental Leadership to recognize innovative and/or exemplary environmental conduct by a Canadian corporation, institution or association.
- 4. Lifetime Achievement to an individual Canadian whose lifetime dedication to the environment has been a source of inspiration.
- 5. Environmental Leadership by a Municipality to recognize an innovative and/or exemplary environmental project or activity by a municipality.

(Nominations in a sixth category, Environmental Science Fair Project, were judged separately.)

Nominations were submitted to Environment Canada and referred to the Council for judging. Presentations to the 1989 winners were made by the Minister at a ceremony in the National Art Gallery on June 4. The winners were:

- 1. Non-profit Organization World Wildlife Fund
- 2. Communications Ms. Annabel Slaight
- Corporate Environmental Leadership Mohawk Oil Co. Ltd.
- 4. Lifetime Achievement Dr. Pierre Dansereau
- 5. Municipal Leadership City of Kitchener

Northern Environmental Issues

Since its inception the Council has given special consideration to environmental conditions and concerns in Northern Canada – the Yukon and Northwest Territories, which encompass more than 40 percent of Canada's land and freshwater area. The Council has made an effort to always have active representation from the North. While the Council has held meetings in various parts of Canada to give members first-hand exposure to local environmental problems and conditions, 1989 was noteworthy as the first year in which the full Council visited and met in the North.

The August 1989 meeting of the Council was held in Yellowknife, and included a visit to Norman Wells for a tour of oil exploration and production facilities. During the northern visit, members of the Council met formally or informally with representatives of several organizations including the Government of the Northwest Territories, the Dene Nation, and the Métis Association. Northern topics on the agenda included: the status of national park proposals, contaminants in the Arctic, land use planning,

the Science Institute of the NWT, sustainable development in the NWT, ecological reserves, environmental assessment of pulp mills in northern Alberta, uranium mining, and National Energy Board hearings.

Prior to the meeting in Yellowknife, the Council was briefed by the Department of Indian and Northern Affairs on contaminants in the North. The results of research and monitoring studies that had recently become available indicated that many classes of chemicals found in southern Canada were getting to the Arctic, and that the main source appeared to be long-range transport by air and water currents.

The Council supported the establishment of a Canadian Polar Research Commission to help co-ordinate Canada's international scientific responsibilities in the polar regions. The Commission had previously been proposed by Dr. T.H.B. Symons in a special report to the Minister of Indian and Northern Affairs. During the Council's visit to the North, representatives of several groups expressed frustration at the delay in acting on recommendations from the 1986 Canada and Polar Science study. It noted that the recommendation had been accepted by the Minister of Indian and Northern Affairs, but had not been acted upon: nor had there been action on supporting recommendations from the follow-up special commission on establishment of the Polar Commission. There were continued calls by the international community for a strong Canadian presence in polar scientific studies and forums.

Land Use Planning and Sustainable Development in Canada

A study that was initiated by the Council early in 1988 was concluded in 1989 with the publication of a report titled, Land Use Planning and Sustainable Development in Canada. The report was released in Winnipeg in May 1989 at the Conference on Environment and Development hosted by the Premier of Manitoba. Since its release the Council has received requests for approximately ten thousand copies from across Canada and from several other countries. Most of the requests have come from professionals, either groups or individuals, and from universities, several of which are using the report as a reference document in planning and related courses.

The Council launched the study as part of its follow-up to the report of the World Commission on Environment and Development. In the Council's view, land use planning has generally been perceived and practised in a very narrow, legalistic, usually localized context, rather than as a holistic, integrated approach to protection and management of the environment. The Council regarded land use planning as a key element in developing a concrete, practicable strategy for sustainable development, particularly by integrating land use planning with other processes such as conservation strategies and environmental impact assessments.

Building on the report, the Council prepared a short list of recommendations for the Minister. In general they called for continued federal leadership in land use planning in order to provide consistent direction and standards such as the federal government does in areas like health, education and justice; and for expansion of the government's valuable role as a source of information on land use planning in Canada. The Council also called for: (1) continued participation by the federal government in land use planning using an integrated approach under the Canada Water Act and other relevant legislation; (2) ensuring that land use planning initiatives provide for the designation of wildlife reserves, ecologically significant areas and national parks, as parts of a network of protected areas; (3) active promotion of provincial conservation strategies and a concerted effort to develop a national conservation strategy; (4) management of federal land to achieve broader social, economic and environmental objectives; (5) preparation of a national set of land use policies and guidelines to provide a common framework for specific planning programs; and (6) use of the Federal Environmental Assessment and Review Process whenever land use changes may have an adverse impact on federal lands.

A summary of the Council's land use planning report appears in this Review as Annex C.

Round Tables on Environment and Economy

The 1988-89 Review of Activities described the Council's support for the work of the National Task Force on Environment and Economy, and its follow-up to the report of the World Commission on Environment and Development. One of the major recommendations made by the Task Force related to the establishment of "round tables" at the national, provincial and territorial levels. The round tables would serve as forums for senior decision-makers from all sectors to work toward integration of environmental and economic matters.

The National Round Table on Environment and Economy (NRTEE) held its first meeting on June 14-15, 1989. Two current CEAC members and one former member were appointed to the NRTEE. Close liaison was maintained between CEAC and the NRTEE Secretariat throughout the year, and a meeting was held between Council representatives and the NRTEE Chairman. Through contact with provincial environment councils and other provincial and territorial representatives, CEAC continued its support for the establishment of other round tables in Canada. By the end of 1989-90, round tables on environment and economy had been created in all provinces and territories except Alberta, Newfoundland and the Northwest Territories.

One particular focus of the Council during the year was to distinguish between the roles of environment councils and round tables. A brief discussion paper was prepared as a backgrounder for the Assembly of Environment Councils. A copy of the paper appears in this Review as Annex E.

ASSEMBLY OF ENVIRONMENT COUNCILS OF CANADA

The assemblies of environment councils are held on an annual basis and hosted on a rotating basis by the participating councils. The meetings provide an opportunity for the councils to exchange information, share common experiences, learn from the experience of others, and build support for shared ideas and concepts. They have been held annually, with a few exceptions, since 1975.

The 1989 assembly was held in Halifax, Nova Scotia, from September 27-29. It was hosted by the Nova Scotia Environmental Control Council. In addition to Nova Scotia, participants included: Alberta, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, and the federal council.

There were two main themes for the Assembly:

- Role of Environmental Advisory Councils vis-avis Round Tables on Environment and Economy;
- Public Participation in Environmental Decisions.

The discussions were launched by two keynote speakers, Dr. Donald Chant of Toronto (a former chairman of CEAC), who spoke on the role of environment councils vis-a-vis round tables, and Mr. Luc Ouimet of Montreal, who spoke on public participation. The deliberations took the form of concurrent workshops and a final plenary session.

With respect to the relationship between advisory councils and round tables, participants at the assembly generally felt that while there might be some overlap of interests and mandates between the two, there were no fundamental conflicts; both were working toward the same goals but from different perspectives. The delegates felt that the Assembly should go on record as supporting the mandate of the round tables, and should look for opportunities to form partnerships.

The delegates strongly supported public participation in environmental decision-making, and felt that environment councils should promote public education on environmental issues. There was particular support for the role of the media in informing the public, but concern was expressed that adequate, unbiased information should be made available to the media.

The recommendations listed below were adopted at the Assembly. It was noted that, in line with the normal practice at assemblies, individual councils were at liberty to adopt and act upon the recommendations as they saw fit.

CEAC To Function As An Information Clearing-House

The federal and provincial environmental advisory councils, meeting in joint session in Halifax, Nova Scotia, 29 September 1989, request the federal advisory council to establish in its office in Ottawa a clearing-house for the exchange of environmental information between the various councils.

The Role Of Environmental Advisory Councils Vis-A-Vis The Round Tables On Environment and Economy

- 1. Round tables should include representatives from the memberships of the environmental advisory councils.
- 2. Environmental advisory councils should provide research support to their members when they serve on round tables.
- 3. Round tables and environmental advisory councils should co-operate on the development and introduction of environmental education programs.
- 4. Environmental advisory councils should be given adequate staff and financial support to fulfill their mandate to monitor environmental issues, conduct careful research, and provide thoughtful and comprehensive advice to their ministers and other relevant bodies.
- 5. Notes should be prepared on the discussions held at the Assembly of Councils which explored the relationship between advisory councils and the round tables. These notes should be sent to all councils for use as they see appropriate in their jurisdictions.

Public Participation In Environmental Decisions

 As an educational approach, and to provide a basic and essential index that politicians can understand, it is recommended that councils ask the public, on a regional basis, to evaluate the state and health of the environment in the various sectors in relation to the state of the environment existing a decade ago.

- 2. Given that all sides in a hearing or public forum should be equally represented, it is recommended that the principle of intervenor funding be accepted.
- 3. Whereas the public must be informed in order to participate effectively in issues directly affecting the environment, it is recommended that advisory councils be leaders in initiating public education in environmentally related issues.
- 4. Given that the media have a substantial impact on how the public perceives the issues and how the public receives the issues, it is recommended that the media be properly informed and involved in real issues, so as not to be swayed by biased opinion, and thereby preserve the independence, diversity and quality of the media as a basic condition of participatory democracy.
- It is recommended that each provincial council prepare a response to the CCREM Task Force on Environment and Economy.

Transboundary Issues:

1. Whereas transboundary issues are becoming common business in terms of treatment by neighbouring councils, and whereas these issues could have significant impacts on future strategies developed at the national level, particularly with regard to negotiations with our southern neighbours (U.S.A.), it is recommended that the Canadian Environmental Advisory Council and the provincial advisory councils communicate wherever possible with one another prior to taking a position on the issue in question, with a view to providing the best possible advice to their respective ministers.

Environmental Impact Assessments:

1. Given the recognized importance of objective environmental impact assessments as a component of sustainable development, and the fact that developments in one province may adversely impact the environment of one or more of the other provinces, it is recommended that the governments of Canada, the provinces and the territories accept the principle that, where requested by one or more of the affected provinces or territories, there should be a full environmental impact assessment with public hearings on that development.

FEATURES

Starting with the current edition, the Council plans to include in each Review of Activities one or more noteworthy articles on the environment. Normally they will be selected from writings by current or former members of the Council, but contributions from other sources will be considered. They will be included in the Reviews to provoke thought and to share environmental insights and views. The articles appearing in this section represent the opinions and observations of the authors, and do not necessarily reflect the views of the Council.

WHAT ON EARTH IS ENVIRONMENT?

by J. Stan Rowe

Introduction

Each mode of knowing entrains its appropriate ethic. The inevitable result of the Western epistemology – scientific, analytic and objective – is a "me-it" ethic, sanctioning individuality and self-aggrandizement. The axis that joins mode-of-knowing to ethics is the base of a triangle whose third point, the ontological dimension, is deep belief as to what is real and important. Years ago, in what has too optimistically been called the Age of Reason, humanity appropriated the apex of the triangle for itself.

The three points of the configuration of knowledge – mode-of-knowing, ethics, and view of important realities – reinforce each other. If *Homo sapiens* is the central reality of the universe and, following from this, if human rights are the sole focus of ethical concern, then science/objectivism is the appropriate mode of knowing, for what else so effectively promotes human interests and power-over? But if things other than humans are of surpassing importance, as today's events lead us to suspect, then the old ethic and the old mode of knowing are also called into question.

Re-conceptions of reality, of what is centrally important, will open avenues of escape from tradition's species-centered ethic and the mode of knowing that serves it.

What humanity's leading vision and direction will be is today's portentous question. The history of where humankind has been in thought and action, and how the race has arrived at the present, is interesting but less important. The modern age suffers from a plethora of ideological theories as to where humanity has gone wrong, and from a lack of vision as to what humanity might become. The prestige of science polishes the rear-view mirror, encouraging the explanatory backward glance that searches out past causes. Ecosophy can do better if it launches an imaginative quest for compelling futures.

Wrong-Way Vision

Note:

To see the world inside-out is to see it wrongly. Yet that is precisely the perspective that people have brought to the interpretation of their role on Earth. The new vision, from outside-in, more accurately portrays the ecological reality. It reveals people, society and human institutions as dependent within the encompassing context of the planet.

How to express this dawning comprehension? New verbal symbols are needed. Old words, carriers of old concepts and thoughts, are unequal to the task. Among the misleading ones are those that refer to human circumstances, to surroundings, to the milieu. Hence the significant question: "What on Earth is environment?"

In the following discussion, three points are stressed:

- 1. As conceptualized at present, "environment" is an obscurant, a grab-bag of elements so hazy in their relationships that attempts at structured thought about them face certain frustration.
- 2. Before it can be appreciated, studied, defended, and sympathetically cared for, "environment" must be conceptualized as the three-dimensional changing and evolving World Ecosphere: a substantial surrounding reality: a Nature that is palpable as well as mystical, creative, life-producing, and life-sustaining.
- 3. The sectoral ecosystems that the Ecosphere comprises must be conceived as structured, evolving, and life-encapsulating, and experienced as biophysical/ecological entities, supra-organismic volumes wherein people individually and communally live, move, and have their being as constituent parts of the planetary surface.

Environment As The Level-Of-Integration Above The Individual

Of all the words commonly used in discussions of ecological integrity and deterioration, "environment" is surely the vaguest. That it stands for something important is attested by the many agencies and departments of governments that busy themselves with managing its parts, and by the army of environmentalists eager to defend them.

Yet beyond general statements pointing up, down, and around to the air, soil, water, food, forests, wildlife, natural resources, wilderness, parks, cities, culture, society, and especially to whatever impacts on community health, few agree about the exact referent of the word "environment".

The Australian Environment Protection Act defines "environment" as "including all aspects of the surroundings of

This essay appeared in the Fall 1989 issue of The Trumpeter, Journal of Ecosophy. Dr. Rowe is emeritus Professor, University of Saskatchewan. He is a former Vice-chairperson of the Canadian Environmental Advisory Council.

man whether affecting him as an individual or in his social groupings". A proprietary essence is distilled by the Canadian Study Group on Environmental Assessment Hearing Procedures in identifying environment as " a collectively shared property". Ontario's Act Respecting Environmental Rights gives a more detailed and representatively chaotic definition, taking environment to mean:

- a. air, land or water,
- b. plant and animal life, including people,
- c. the social, economic and cultural conditions that influence the life of people or a community,
- d. any building, structure, machine or other device or thing made by people,
- e. any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities of people, or
- f. any part or combination of the foregoing and the inter-relationships between any two of more of them, in or of Ontario.

Note that after brief mention of "air, land or [sic] water", the focus is determinedly on people in their cultural setting. That is typical of the strong bias toward socio-economic concerns that tends to dominate not only provincial but also federal environmental assessment and review processes, deftly substituting people problems for those of the broader sustaining milieu which accordingly suffers neglect.

The difficulty stems from perceptions that humanity is in control of the world, possessing it as property, successfully shaping it through the cultural tools of science and technology. This pre-ecological attitude, popularized particularly by Marxists, conceives "mere" nature and "brute" nature as little more than dross until assimilated purposefully by man into rational-intentional forms. Nature is an erratic, disorderly bitch to be tamed, domesticated, and reformed in the service of humanity. Hence the deduction that the important environment is the built environment along with its socio-economic culture.

The ecological revolution of the second half of the twentieth century demolished the fiction of human self-sufficiency. True, each individual draws mental and physical support from society and from the artifacts provided in the built environment; but the social context, to be vital, must also include the life-supporting processes of the world, of natural ecosystems. Human culture may improve the efficiency of the extraction of materials and energy from Nature, but it is not itself the materials and energy. The community may provide meal tickets for human banqueting, but it is not itself the sustenance. The

"socio-economic environment", considered of foremost importance, is in fact attached by the umbilical cord of technology to the planet's vital processes. It is dependent on them and functionless without them. The economy, supported by the Ecosphere and its sectoral ecosystems, will soon be dead unless "sustainable environment" attracts more attention than "sustainable development". Populations and communities and cultures are not integrated levels-of-organization because they omit, in concept and in fact, the matrices that confer substantiality. If those binding and supporting matrices of Nature are added, then populations, communities and cultures are transfigured into substantial ecological systems: into ecosystems.

In order to be consistent with the nature of the organisms that "environment" surrounds, the latter must be as tangible as they are, but at a more inclusive level-of-organization. This higher level is the definition of an ecosystem, i.e., all the biota within a given volume of World-space integrated with that World space.

Common language obscures this logic by presenting populations, communities, societies – all of which are non-volumetric taxonomic categories – as if they were substantial entities equivalent in status both to volumetric organisms and to the three-dimensional ecosystems that encase organisms. They are not. The categories are as different as the abstract species *Homo sapiens* and an honest-to-God wise man. Further, a false tangibility is frequently granted to the aura of ideas that holds human populations and communities together.

As long as environment is interpreted as referring primarily to people-associations and their institutions in the cultural milieu, as long as it is muddled up with the socio-economic system and with such abstractions as Teilhard de Chardin's "noosphere", the tormented world will not get the attention it needs and deserves.

Environment Its Own Pejorative

The etymology of "environment" offers no easy path out of the morass created by hazy concepts. The word is derived from the French *virer*, to turn, whence *en* (in) + *viron*, meaning to encircle. To be around, to encircle, implies a centre, suggesting that other things of greater interest lie within. Thus nebulous "environment" surrounds more sharply defined realities, such as organisms and people, from which at second-hand it derives its status. A subtle sycophant, environment used in this way reflects back to people their preoccupation with themselves.

Environment's self-effacement is the source of its problems. If it is merely peripheral, consisting of the secondary odds and ends that surround people, then people are obviously more important than it. Hence, in the crunch when choices must be made, say between more industrial development to enrich and bedizen humanity versus less industrial development to protect and maintain the environment in beauty, health and permanency, the response is, "First things first, and let environment take its chances." After all, which is more important: people or tropical forests, farmers or fertile soils, jobs or environment?

Furthermore, by extension of the same logic, if society does not continually increase industrial development, forcing economic growth both domestically and internationally by fostering trade and consumption, then where will the wealth come from to clean up the environment? The message is clear: "Seek first a vibrant economy, for wealth will cure all ills". In the works of the Brundtland Commission, the key to progress is forceful economic growth.

Flying in the face of such logic are the worsening problems of chemical changes in the atmosphere, of water pollution, soil degradation and food toxification, as economic development intensified by population growth gathers speed world-wide. Today's problems suggest that whatever the people-encircling "environment" may be, its importance far exceeds that conveyed by the weak word. Behind the diffident verbal disguise lies a reality greater than "that which (merely) surrounds organisms." Indeed this latter definition, adequate for biologists narrowly fixated on biota, must be replaced by one more substantial; namely, the planetary ecological system in which organisms are encapsulated as parts.

Recognition of the global ecosystem as the objective thing behind environment's facade will mark a major conceptual advance for the human race.

The Ecosphere Is The Prime Reality

The immediate reality for people on Earth is the layered skin of the planet, no less miraculous for appearing commonplace and simple in composition. It consists of a thin gaseous stratum resting on liquid and solid strata, with organisms concentrated at the phase boundaries. The gaseous layer is the atmosphere, the liquid is the hydrosphere, the solid is the soil-and-sediment bearing lithosphere. Within this three-way matrix, organisms and

their surrounds are often said to comprise a communal fourth sphere, the biosphere – a term apt to mislead by suggesting the pre-eminence of organisms.

Actually all four constituents – air, water, earth, and organisms – are essential parts of the one homeostatic whole, the Ecosphere: literally the Home-sphere. This word for the planetary ecosystem has the double advantage of reminding humanity where it is domiciled while expressing no prejudice in favour of organisms; hence no denigration of earth, water and air as less than organisms, as merely their environment. It implies equal importance among all components while also implying that everything existing within the Ecosphere, including the human race, is a product of it, a subdivision of it, a part of it, and therefore less important than it. The Whole Home is the prime reality; all else within is fragmentary, disarticulated, lost, and meaningless until conceived and experienced in the context of the Ecosphere.

The derivations of the words "art" and "religion" suggest that their functions are to seek ways of joining and of binding together. Both human quests can fruitfully ponder the questions that ecological insight into the Ecosphere-people relationship poses for articulators and healers: Who in the World are you? What on Earth are you doing?

Ecosystems: Sectors Of The Ecosphere

The Ecosphere shell that encases the planet is bubble-thin but four-dimensional in space and time. Like the air masses, soils, and oceans that are parts of it, the Ecosphere can be sectioned into particular ecosystems by conceptually imposing boundaries. Each ecosystem is a layered "box" abstracted from the Ecosphere, its air layer overlying a soil and/or water layer and with organisms encapsulated at the solar-energized interface. Each ecosystem, like a larger version of the microcosm aquarium or terrarium, is a segment of the Ecosphere, a part possessing a higher order of organization and integration than its constituent air, water, sediments, and organisms. Note that ecosystems are neither organisms nor super-organisms. Ecosystems are supra-organismic; they are different from and more important than organisms.

The Ecosphere is realistically conceived as comprising a hierarchy of ecosystems, like boxes within boxes, defined at various scales – zonal, regional and local – for purposes of contemplation, study, and ministration. These sectoral ecosystems – simplistically named seas, continents, mountains, plains, deserts, forests, lakes, rivers, settled

lands, farm fields and towns, according to prominent natural or cultural features – possess an importance that far transcends their contents.

The myriad forms of evolved life are the historic fruits of these evolved volumes and their contemporary components. Humanity came into being within regional ecosystems – forest, savanna, grassland, seashore – as symbiotic parts of them, along with a host of companion organisms of equal merit and importance.

Living things arose within the ecosystems that the Ecosphere comprises. Thus the truth: Life is a phenomenon of the Ecosphere. Life is not something possessed by organisms, except in a limited and incomplete sense. From this a corollary: "ecosystems have organisms" is a more discerning idea than the conventional "organisms have environments."

The Heavenly View

Another Copernican revolution began when the electrifying moon-shots of the world came back from outer space, for they provided visual proof of a supra-organismic reality: a sun-circling, clouds-swathed, blue-and-green globe in whose structure, processes, and functions people participate along with a host of other life forms.

The outside view, the heavenly view, cast humanity in an ecological perspective that could not be ignored. In the beginning was the World. In and from it, by some generative miracle, dependent people emanated.

Consider how this vision could have enlightened knowledge, philosophy, science, art, had it been granted four hundred years ago! Suppose people had been given the heavenly view to see the Earth whole before, immersed in it and feeling around like the blind men with the elephant, they had built up their fabled ontology, deciding that this fragment and that fragment, this piece and that piece were separate, autonomous, real.

With such transcendent insight at the time of Galileo, the geniuses of the race could hardly have failed to recognize the Ecosphere as the Unity, the Whole, the reality to evoke wonder and valuation above all else.

After the impact of that recognition, the arts would surely have taken a truer path, at least to the extent of diluting the humanistic narcissism that today is killing the world. Science too, the servant of humanity's questionable quest for power, might have escaped its narrow stultifying focus on human welfare and its naive faith in coercion of Nature as "The Way".

Seeing the world whole, the race's thinkers might have brought their reductionist analytic skills to the task of better understanding the evolutionary processes in the history of the Ecosphere, viewing with amazement its contemporary functional unity, identifying the major components – atmosphere, ocean, continental platforms, plant and animal assemblages – and anatomizing these in turn, but always aware that they were perceiving parts of a magnificent Whole.

Eventually, by dividing and subdividing, the savants would have come down to themselves – to humankind, one of the Ecosphere's interesting species, hundreds of millions of protoplasmic "cells" tumbling about the surface of the planet like curious leukocytes; a self-conscious constituent gifted with glimmerings and premonitions of the part-whole relationship, the matter-mind relationship, the mind-spirit relationship; a part apparently intended to be the conscience of the world and its caretaker.

But this is not human history. It has not yet happened. Humanity's thinkers, submerged in the Ecosphere, were unaware of the surrounding Whole. Inside it, they could not comprehend their medium. They did not perceive that things other than their kind might have important functions, purposes and roles in the context of the larger unsensed reality. They interpreted as separate entities all the light-reflecting objects perceived, starting with themselves as most important and working outward to other things with properties most like themselves: animals and plants. Latest in the scheme of importance came the peripheral odds and ends of air and climate, soils and sediments, salt water and fresh water, surface and subsurface rocks and minerals. When the utilitarian aspects of such parts were recognized, they were called "raw materials" and "resources"; when their life-enhancing properties drew sufficient attention they were dignified as "énvironment". In the 1980's they are deemed worthy of protection – "by forceful economic growth" in the words of the Brundtland Report.

The view from the outside came 400 years too late. By the time it arrived scientists had already accepted the planet and the universe outside it as a dead machine, a conglomeration of little balls made up of little force fields. Disciplines budding off from physics developed their own purblind fields of materialistic expertise, their own autonomous objects of interest that soon were set in cement, their practitioners assured of certain certainties as to the nature of reality and that which merited study.

Dazzled by the popularity and power of the natural sciences, the social sciences and humanities followed suit, accepting the ontology of disarticulation and its matching

epistemology of objectivism. Universities and governments were de – part – mentalized to manage the fragmented world.

And so the truthful vision recently gained is confounded by a tradition foreign to it, written out in millions of books and treatises which assume as axiomatic that the bits and pieces of the Ecosphere are free-standing entities whose Godgiven purpose is to service the species that has arrogated for itself the specific epithet sapient. "The proper study of Mankind is Man" – "The Earth is our Heritage" – "Resources were put here to be used" – such ideas, conventionally believed to be wise, are nonsense.

Thinking The World To Pieces

Glimmerings of ecological comprehension suggest that the fragments studied in physics, chemistry, biology, sociology, psychology, theology, and the other disciplines are indeed parts; that evolutionarily and functionally, what have been named atmosphere, hydrosphere, lithosphere, and all the associated protoplasmic bundles that "biosphere" comprises have no separate reality except as wrong ideas implanted by a crude culture in infantile heads. Humanity has used its consciousness to think the world to pieces.

How difficult it is to comprehend that the only unity with which people are in close touch is the Ecosphere, one of whose properties is the phenomenon called life. Life is not a property of complex protein molecules arranged in double helixes, nor of the ordered mixtures of substances that constitute protoplasm. Life is a property of the skin of the planet and of the ecological systems that the skin comprises.

One-eyed biology, lacking depth perception, has misled by conceiving a world divided into the animate and the inanimate, the organic and the inorganic, the biotic and the abiotic, the living and the dead. The divisions are not only wrong, they are mischievous for they devalue essential parts of the Ecosphere. What would qualify as animate, organic, biotic and alive without beneficent sunlight, water, soil, and air? These components are as vital, as animated, as important, as the organisms whose life giving sustenance they are.

Synthesis

The implications of the idea that the whole globe is an ecological entity – the Ecosphere – of which people as

individuals and as communal groups in their built environments are parts, remain to be assimilated. This is today's primary task.

A beginning is to perceive humanity as one kind of dependent deep air animal, living at the bottom of the atmosphere in a confined solarium, despoiling the renewable means of its sustension, crying "more growth – more growth", injecting unnatural resources from underground into the life-space, roiling up the sediments, rendering the surroundings murky, denaturing the paradise that produced it, and all in the name of human welfare.

People exist within and as parts of the Ecosphere that, over eons, produced them, nourished them, sustained them, regenerated them, and will continue so to do as long as its healthy functioning is unimpaired.

People stand in the same relationship to the Ecosphere as the fetus to the woman; the welfare of both are interdependent, but the priority of importance clearly rests with the mother, with the larger surrounding and nourishing system.

Re-conceiving vague "environment" as something real and substantial, as the enveloping four-dimensional Ecosphere, gives new meaning to environmental protection. It confers intrinsic values not only on all organisms but equally on air, soil, water, and on the unity of these things. It casts two-dimensional land-as-area in the perspective of three dimensional ecosystems that interact locally, regionally, and globally, providing insights to the intrinsic worth of the planet's surface.

Most importantly, the concept of Ecosphere as the prime reality can begin the cure of the disease of homocentrism by turning attention outward, ecocentrically. It lifts the human imagination above the slough of despond that is the outcome and heritage of philosophies and religions selfishly turned in on the human species, myopically fixated on nothing greater than individuals, societies, communities, cultures. It provides a new standard against which human ideas, moralities, and activities can be evaluated. Do they sustain the natural systems and processes of the World that themselves sustain all life? It offers a choice: is humanity to be the conscience of the planet or its despoiler, its cosmetician or its cancer?

No longer can the one and only question be: Is this particular technology, science, art, culture, development, good for humanity? A more momentous question takes precedence: Is it good for the Ecosphere? This, in the future, must be the ethical test of public policy and of individual intent.

References

- 1. Environment Protection (Impact of Proposals) Act, Commonwealth (Federal) Government of Australia. 1974.
- Public Review: Neither Judicial, Nor Political, But An Essential Forum For The Future Of The Environment. A Report Concerning the Reform of Public Hearing Procedures for Federal Environmental Assessment Reviews, Canada 1988.
- 3. An Act Respecting Environmental Rights in Ontario. Bill 9, Ontario Legislative Assembly 1987.
- 4. Rowe, J.S. 1961. *The Level-of-Integration Concept and Ecology*. Ecology 42: 420-427.

THE ROLE OF ENVIRONMENTAL ADVISORY COUNCILS VIS-A-VIS ROUND TABLES ON ENVIRONMENT AND ECONOMY

by Dr. Donald A. Chant

Raising the issue of the role of environmental advisory councils vis-a-vis round tables on environment and economy seems to have its roots in two main questions: how can the round tables and councils define clear roles for themselves — separate, important, worthwhile, complementary? And, will the glamorous new round tables, based on the new political buzz concept of "sustainable development", supplant the old and familiar advisory councils and put them out of business? The first is a good question; but the second suggests a strong element of insecurity, however understandable it may be. In my talk today, I will try to give some of my views on both questions from my own personal perspective. I will emphasize my views on the round tables to help you define for yourselves the roles of councils.

First, I want to say a few words about "environment and economy" and the concept of sustainable development that underlies the round tables. Public concern and public expectations have so far outstripped the performance of our government and industry that cynicism and suspicion are widespread. I hope this is temporary and that our leaders will somehow begin to lead rather than simply to mouth support for concepts that they, as yet, only dimly comprehend. The most common opening gambit from politicians these days is to look you in the eye and earnestly inform you that of course they have been environmentalists all their lives. One of the most widespread slips of the tongue these days on speakers' platforms and in reports from bureaucrats across the country, is to refer to the concept of sustainable development as "sustainable growth" - or even worse, "sustained development".

However disturbing are these revealing slips of the tongue and this tawdry political opportunism, they do not warrant an attack on the concept itself, which to me holds the only hope for our future. To attack the concept with cynicism because it is so poorly understood and so often misused and misinterpreted, is a bit like saying honesty and truth are no longer valid and worthy guides to individual behaviour because there are so many crooks and liars among us. To state that one is opposed to the concept of sustainable development, as the United States has done, is to betray either breath-taking ignorance or a willful refusal to accept the obvious.

Note:

Ecologists have long been familiar with the concept of sustainability as applied to other species. Any other species which strays from the path of sustainability suffers consequences that are swift and sure – they exhaust their resources and/or poison their environment with wastes, their populations crash, and they become locally extinct if not extinct as a species. We are not different. *Homo sapiens* is not immune to the laws of nature, even though we have wonderful powers of self-delusion. Carry on as we are, and our moment in the sun will pass very quickly.

Having said this, the concept of sustainable development is not yet widely understood among us, and we have not yet clearly and carefully thought it through as it applies to us, to our society, to our nation, let alone to the world as a whole. What does it mean to you and me personally? How will I have to change my behaviour and lifestyle? What sacrifices will I and my children have to make? How must chief executive officers and the leaders of industry change their policies and decisions and ways of measuring the successes of their enterprises? How can our governments reverse old policies and develop new ones that will remove barriers to achieving sustainability, and encourage and provide incentives for doing what we must do in the future? In the long run, perhaps most important of all, how can we persuade the rest of the world to abandon the old concepts of growth and consumption that, on the surface of things, appear to have served us well until very recently - and in particular how do we persuade the so-called underdeveloped nations to abandon the role model that we have provided and which they still envy and wish to emulate?

We are speaking about a genuine revolution, probably the most dramatic and wide-ranging revolution in our entire million years or so of evolution – a revolution in human behaviour, in understanding, in thinking. It will take a miracle to pull it off in the time that still remains, but miracles should not be beyond the reach of human ingenuity and self-interest.

It is this enormous challenge, then, to which our round tables must turn their minds. They must define the concept of sustainable development for us; tell us what it really means; carry its message to first ministers and everyone else

This was a keynote address at the 1989 Assembly of Environment Councils. Dr. Chant is the Chairman of the Board and President of the Ontario Waste Management Corporation, and a former Chairman of the Canadian Environmental Advisory Council.

in our society; and persuade us that we have no option but to accept the principles on which it is based. It is the round tables which must foster real-world demonstration projects to show us that the sky won't fall if we abandon our old consuming, polluting, destructive fascination with growth and expansion at any cost. It is the round tables which must create the linkages between the mosaic of competing interests, mandates, perceptions and values that make up our society and our governmental structures; and must ensure that all the pieces fit well, complement and support each other as we change direction toward new goals - goals of living off our resource and environmental interest rather than eroding our resource and environmental capital goals of sustainability - goals of survival. These are mighty and daunting tasks and our round tables must dedicate themselves to their accomplishment.

Given this broad mandate, the round tables will have relations and modes of operation quite different from those of advisory councils. They report to first ministers; are usually chaired by a senior economic minister; have other cabinet ministers as members, and representatives from many interest groups, not simply those that represent the environment in traditional terms. Consequently, they are large and they require significant staff and budget resources if they are to be able to do their jobs. Given their nature and mandate, it is unlikely that members personally will conduct projects and undertake studies themselves. They must contract out, limiting their direct involvement to conceptualization, direction, review and approval of the necessary work. Hopefully, the round tables will be apart from the bureaucratic compartmentalization of governments (and therein lies an inevitable problem of being orphans if the first ministers do not take them seriously), and will be able to avoid confrontation with entrenched, traditional bureaucrats with their intense dislike and resentment of independent bodies outside their control and pecking order (bureaucrats hate those who have direct access to their masters). If the round tables can escape compartmentalization, and confrontation, they will be able to exert their influence across lines and through walls, and reach out beyond government to all the other sectors of our society and to the public at large. They must quickly assert their rights to do this with the first ministers - their work cannot be done entirely behind closed doors and they must have the right to report at large. This does not preclude a first minister from asking a round table for advice in confidence, though frankly I think this unlikely except, perhaps, insofar as a first minister might wish for advice on his or her interactions and discussions with peers, either between provinces at conferences of first ministers, or internationally.

Generally, however, round tables should not find themselves simply reacting to requests from first ministers or marching to their drums. Rather, they must seize the initiative, define their own roles and programs, and aggressively get on with their jobs.

Over the last few months I had the privilege of being asked to take part in the inaugural meetings of the round tables in Prince Edward Island, New Brunswick, and Nova Scotia, together with the respective premiers. I was here in Halifax last February for this purpose. Each wanted my views, as a member of the National Task Force on Environment and Economy, on what the round tables should do, short and long-term.

My advice included the following:

- 1. Respond to the Brundtland Report and the report of the National Task Force.
- 2. Think through the concept of sustainable development and define what it means.
- 3. Encourage the development of provincial conservation strategies (e.g., Prince Edward Island, 1987).
- 4. Establish priorities. Everything cannot be done at once. What should receive first attention in integrating environment and economy and in striving to move toward sustainable development? Is it declining fish stocks or forest policy or air and water quality or land use planning or sewage plants or harbour cleanups or reducing and treating toxic wastes properly? What, exactly?
- 5. Mount demonstration projects at manageable local levels. For instance, there are many communities in our country which are threatened by uncontrolled growth. Choose some as demonstrations and help them develop policies oriented toward sustainable development.
- 6. Establish contacts and working relations with other round tables.
- 7. Establish working relationships with other institutions: universities, the IRPP, business and industries, unions, conservation and environmental groups, and so on.
 - I also gave my advice on a few "Don'ts".
- Don't try to do everything at once.

- Don't dwell on past and present problems. Look ahead.
- Don't go off on ideological crusades. These should not be political issues, and sustainable development and environment and economy should not be politicized.
- Don't be too academic or theoretical. Be practical.
- Don't think these are only "environmental" issues and that only a few trees and dickeybirds are at stake. We are talking about human survival and the well-being of our species, for heaven's sake.
- Don't fight among themselves. There should be no "we" and "they": everyone must strive to talk and work together. The National Task Force was a good example of working together.

So much for grand strategy. Now, let me turn to the advisory councils – back to the trenches. No matter how good and elegant the grand strategy, no matter how colourful the broad brush strokes, battles are won or lost in the trenches. One trench of vital importance is the environment, pure and simple, and advisory councils have a vital role to play. If they fail, we all lose and the stakes are high. Neither the round tables nor the environment councils are more or less important than the other. We cannot succeed without both.

Environment councils relate not to first ministers but to a particular minister, and probably the most important minister of all in the context of what we are trying to achieve. Our environment ministers are in the thick of the fray - or they should be - and they will have to fight many battles with other short-term interests that are at odds with the concepts of sustainable development and environmental protection. They must come to feel possessive about their councils and to see them as important weapons as they gird themselves for battle. Councils have important roles to play in assisting and supporting the ministers to whom they report in dealing with conflicting interests in Cabinet, and in ensuring that the environment ministers are effective with the round tables, which they don't own. They must provide the ministers with support and inspiration in guiding and steering the round tables in the directions in which they must go. If ministers aren't smart enough to see this for themselves, it is up to councils to tell them so in no uncertain terms.

Councils also, of course, have an important role to play in providing the ministers to whom they report with advice and support on environmental issues, when the ministers want it — or need it. Such independent advice and support outside the traditional bureaucratic system is extremely important, and hopefully the environment ministers will come to realize this and welcome it as they find themselves more and more in the hot seat. The ministers must come to want advice from their councils, not only on issues clearly within the mandate of environment, but also to balance the round tables which are not theirs.

The environment represents a subset of issues in the overall concept of sustainable development — a vital subset, complex, interwoven, and to which the public at present relates much more clearly and with much greater concern than to the idea of sustainable development. We must not let the broadening of our horizons to encompass the concept of sustainable development lure us away from the environmental trenches. Environmental concerns, the development of better environmental policies, the enforcement of better environmental regulations, must be of paramount importance, and councils must play a central part in sustaining these interests and ensuring that they are not rejected or set aside by the broader issues of sustainable development and environment and economy.

To ensure this, councils must not only be responsive to their ministers, they must also be self-starters on issues identified by the councils themselves – and many councils, of course, have already achieved this. It would be wise, I think, for councils to review their interests, concerns and programs in the light of the establishment of round tables, and make sure that there is a common understanding between themselves and their ministers as to what it is they should be doing.

In short, councils must maintain their traditional roles within the context of departments of the environment and ministers of the environment; ensure that clear-cut environmental issues are not lost in the rush to climb on the sustainable development bandwagon; and take on a new responsibility to support their ministers - to provide them with ideas, information, moral support - to ensure that the ministers play the important roles they must at the round tables. To achieve this, they must work as never before to establish trust with their ministers and have them realize what an important resource the councils are for them. Ministers themselves must realize the importance of their councils, not only in helping them to deal with the increasing flood of environmental problems but also in making certain that environmental absolutes are paramount in the new round tables on environment and economy.

In the final analysis, councils must not let the present growing interest in sustainable development, with its grand sweep and potential to influence our lives in almost every way, lure us into ignoring the vitally important day-to-day and year-to-year discrete, clear-cut, **environmental** issues. Hopefully, by the establishment of the round tables we have added new components to the system we are putting into place to deal with the future, and not simply substituting one thing for another.

If I have one message for you today, it is that we badly need – we must have – **both** the new round tables and the established environmental advisory councils.

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LIST OF PUBLICATIONS

Reports

- 1. An Environmental Impact Assessment Process for Canada, February 1974 (out of print).
- 2. An Environmental Ethic Its Formulation and Implications, by N. H. Morse, January 1975 (out of print).
- 3. Harmony and Disorder in the Canadian Environment, by P. Danserau, 1975 (English out of print).
- 4. Towards an Environmental Ethic, by D.A. Chant, March 1977 (out of print).
- 5. Environmental Aspects of Nuclear Power Development in Canada, by H. E. Duckworth, H. W. Porter and J. S. Rogers, 1977 (out of print).
- 6. Report of the Second Joint Meeting of Environmental Advisory Councils, May 1977, Fort San, Saskatchewan. (Produced in collaboration with the Saskatchewan Environmental Advisory Council, March 1978).
- 7. The Management of Estuarine Resources in Canada, by I. K. Fox and J. P. Nowlan, March 1978.
- 8. Report of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council, May 1978.
- 9. *Ecotoxicity: Responsibilities and Opportunities* by R. H. Hall and D. A. Chant, August 1979.
- 10. Report of a meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Published in 1981.
- 11. A New Approach to Pest Control in Canada, by R. H. Hall, July 1981.
- 12. Wildlife Conservation Issues in Northern Canada, by I. McTaggart-Cowan, October 1981.
- 13. Water Management Problems in the Third World: Lessons for Canada, by P. F. M McLoughlin, March 1983.
- 14. Terms of Reference, March 1984.
- 15. Report of the Eighth Assembly of Environment Councils of Canada, May 1984.

- 16. Selected Papers from Assemblies of the Environment Councils of Canada, 1975-1980, March 1985.
- 17. Sustainability of Farmed Lands: Current Trends and Thinking, by C. F. Bentley and L. A. Leskiw, March 1985.
- 18. Examining Environment-Economy Linkages, by R. A. Knowles, 1986.
- 19. Freer Trade and the Environment, May 1986.
- 20. Enforcement Practices of Environment Canada, by L. Giroux, June 1985. Published January 1987.
- 21. Review of the Proposed Environmental Protection Act, March 1987.
- 22. Canada and Sustainable Development, December 1987.
- 23. Preparing for the 1990s: Environmental Assessment, an Integral Part of Decision Making, February 1988.
- 24. Listing, Toxics Under CEPA Is the Chemistry Right?, May 1988.
- 25. PCBs: A Burning Issue, February 1989.
- 26. On the Role of Environmental Councils, In Relation to the Canadian Environmental Advisory Council, by Dr. P.M. Bird, 1989
- 27. Land Use Planning and Sustainable Development in Canada, by Nigel Richardson, 1989

Annual Reports

Annual Review 1973-1974. Part A – Activities. Part B – Problems and Priorities in the Canadian Environment.

Annual Review 1975. Part A – Activities. Part B – Significant Environmental Problems.

Annual Review 1976. Part A – Activities. Part B – The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A – Activities. Part B – The State of the Canadian Environment.

Annual Review 1979-1980. (Includes: A Decade of Environmental Concern: Retrospect and Prospect; Environmental Assessment and Review Process: Observations and Recommendations).

Review of Activities 1981-1982; 1982-1983. (Includes: A Perspective on the Canadian Environmental Advisory Council; Resolutions of the 1981 Assembly of Environment Councils of Canada).

Review of Activities 1983-1984. (Includes: A Submission to the Royal Commission on the Economic Union and Development Prospects for Canada; Acceptable Risk; Assessing Proposals for a Canadian Pesticides Advisory Board; Completion of the National Park System in the North; The Key to the Future).

Review of Activities 1984-1985. (Includes: Guidelines on Conflict of Interest Situations; The Central Council for Environmental Protection in the Netherlands; Canadian Agricultural Land Base: Quantity and Quality).

Review of Activities 1985-86; 1986-87. (Includes: Ethics and Environment; A View Towards 2005 – Future Environmental Trends and Issues).

Review of Activities 1987-88; 1988-89. (Includes: Sustainable Redevelopment: Focus for the University; Towards Sustainable Economic Development).

LAND USE PLANNING AND SUSTAINABLE DEVELOPMENT IN CANADA

Summary

The imperative need to devise and implement a formula for sustainable development has occupied both the (Brundtland) World Commission on Environment and Development and Canada's National Task Force on Environment and Economy. The Task Force defines sustainable development as development which ensures that the utilization of resources and the environment today does not damage prospects for their use by future generations. This remains, however, more an aspiration than a plan of action. The land – the solid ground we walk on – is fundamental to almost every kind of economic activity, and it is also a vital component of the global ecosystem. This paper argues that land use planning can therefore be a key element in devising a concrete, purposive strategy for sustainable development.

The Evolution of Modern Land Use Planning in Canada

Land use planning is broadly defined here as the process of making considered decisions about how people should use (or leave unused) some part of the earth's surface, having regard to known and expected circumstances and to given aims and/or criteria.

Land use planning in Canada extends back at least to the earliest days of European settlement. In the early decades of the 20th century, a growing awareness of resource depletion, inappropriate use of rural lands, problems of urban growth, and other land-related issues, produced both the beginnings of urban planning under municipal authority, and the creation of the federal Commission of Conservation. The work of the Commission, and in particular of its adviser Thomas Adams, linked resource conservation, efficient use of land, public health and other aims in a way which anticipated Brundtland and the National Task Force by 70 years.

But these achievements were largely dissipated and forgotten in the '20s and '30s. And although their spirit was revived by the federal government's Advisory Committee on Reconstruction, appointed during the Second World War, the enormous demand for housing in the postwar years and the consequent problems of urban

growth, including the building over of prime agricultural land, dominated Canadian land use planning for decades. These preoccupations led to the adoption of various forms of city-centred "regional", or intermunicipal, planning in most provinces. Gradually the conservation of resources, including water, the planning of resource use, and environmental protection, reemerged as aspects of land use planning.

Unfortunately the Canadian practice of splitting jurisdictions over different aspects of land use, both within and among governments, largely frustrated the development of land use planning as a truly integrated activity with a coherent set of goals. As a result environmental impact assessments and conservation strategies have emerged as activities only tenuously linked to established land use planning processes.

Throughout the development of land use planning in Canada during the 20th century, the federal government has taken a prominent and often leading role. Examples include the Commission of Conservation, the Advisory Committee on Reconstruction, and the Central/Canada Mortgage and Housing Corporation, which was in its way as influential as the Conservation Commission; federal initiatives in regional economic development, river basin planning and environmental impact assessment; and the crucial role of federal agencies as sources of land-related information.

Land Use Planning as a Contemporary Area of Public Policy

Whatever its limitations, land use planning is now well established in Canadian law and public administration, and it is generally – if not always warmly – accepted by the public as a legitimate function of government.

However, the use of the term "land" in most planning legislation and programs follows the legal tradition which European settlers brought with them. This falls considerably short of the wider perception of "the land" as "the environment" or "the ecosystem". Although this paper advocates a more comprehensive understanding of "the

Note: This is an extract from a report prepared for the Council and published in 1989.

land", it argues also that the pervasive importance of land even in the narrow sense, combined with the established place of land use planning in law, administration and public acceptance, provides a valuable tool for sustainable development.

Land use planning should not, however, be thought of as a standard administrative formula or operational technique. It is rather an approach, a way of perceiving conditions, that can apply in many ways to many different sets of circumstances. This is its great strength (although also a source of difficulty, as is touched on below). It is distinguished by a particular set of characteristics which ideally include:

- explicit goals,
- identification of land-related problems and issues,
- anticipation of future conditions and needs,
- comprehensiveness in taking all relevant considerations into account and in involving all land-related public programs,
- continuity over time,
- combining a systematic approach with flexibility,
- identification of responsibilities,
- providing appropriate opportunities for participation by all concerned,
- providing decision-makers with options,
- recognising the exigencies of plan implementation.

Examples of Contemporary Canadian Land Use Planning

The paper employs several examples from the very wide range of contemporary Canadian land use planning to illustrate its potential as a tool for sustainable development. They illustrate also its present fragmented state.

Municipal Planning: The term land use planning is widely associated with its commonest form, municipal planning. Land use planning by municipalities is usually directed towards the specific objectives of local government. These seldom include such matters as conservation and may even be contrary to the aims of sustainable development (though some municipalities have made very positive efforts).

But the powers that can be exercised are substantial and could be extremely effective if employed to promote sustainability.

In Alberta the provincial government uses regional planning commissions to secure municipal adherence to its Policies, while Quebec's regional county municipalities provide a mechanism for co-ordinating provincial and local land use policies and planning.

Crown lands: The planning of Crown lands and resources has tended to be strongly oriented towards maximum economic return, but is moving towards conservation, sustained yield and multiple use.

Ontario's Strategic Land Use Plan program is an example of systematic but narrowly-oriented "top down" resource use planning; the Manitoba system also tends to be "top down" but in relation to a much broader range of government policies and objectives; Alberta's Integrated Resource Planning System involves broader participation and is, within its limits, almost a model land use planning system.

Protection of agricultural land: This is an extremely complex issue with aspects that cannot be addressed solely in terms of land use. Several provinces, notably British Columbia and Quebec, have nevertheless adopted special measures to restrict the conversion of farmland to other uses.

Special cases: There are many examples of special arrangements to provide for land use planning outside the normal legal and institutional framework. Those discussed here are the Mactaquac Regional Development Plan in New Brunswick, an early attempt to promote sustainable development (before the term was invented) through land use planning; the Haldimand-Norfolk Study in Ontario, in which a comprehensive environmental appraisal provided the basis for regional land use planning; and Ontario's Niagara Escarpment Plan, in which land use planning is used to protect a valuable scenic, scientific and recreational resource in the face of diverse competing demands.

Northern Land Use Planning Policy: In the Northwest Territories, the aboriginal perception of land, the unity of environment, economy and way of life, and a strong conservation initiative, have combined to produce a draft regional land use plan which could equally well be termed a plan for sustainable development.

Water: Planning for water and water-related uses, and water quality, is extremely complex for a number of reasons. Nevertheless, three provinces are addressing the problem with some success. Saskatchewan and Alberta work through provincial river basin planning with wide participation. Ontario employs watershed conservation authorities. The federal government has participated in joint river basin planning for 20 years, and the principle is now entrenched in the Federal Water Policy. Ecosystem-based planning has become the goal in the case of the Great Lakes basin.

The diversity of land use planning in Canada is compounded by the existence of public programs which affect land use or are closely akin to land use planning, but which are not usually integrated into established land use planning systems. These include, notably:

- Regional economic development programs which influence land use patterns and which sometimes address land use directly.
- Environmental impact assessment, which tries to anticipate the environmental consequences of individual land development projects.
- Conservation Strategies, which include the development of policies and programs to govern the use of land in the interests of conservation and sustainable development.

On the other hand, there are also efforts to co-ordinate land use planning and other land-related public programs, including environmental impact assessment. The principal approaches are:

- Comprehensive land use policies adopted by governments to guide all land-related government programs. The most notable examples are the Federal Policy on Land Use, and Manitoba's Provincial Land Use Policies.
- Co-ordination of land-related programs through political and/or administrative structures and procedures, with or without a general policy framework.

These exist in at least rudimentary form in all provinces. They are particularly well developed in Manitoba and Quebec, though in quite different forms. In Manitoba they operate from the top (cabinet committee) down, in Quebec through provincial-municipal co-operation through the medium of the regional county municipalities.

 Area-specific co-operation, in which various government programs are co-ordinated in a joint effort to address specific land-related issues in a particular area. The Fraser River Estuary Management Program in British Columbia is a good example.

The paper includes brief descriptions of some programs in other countries to provide further illustrations of the range and potential of land use planning.

Comments and Conclusions

The paper concludes that the effectiveness of land use planning as a tool for achieving sustainable development has been clearly demonstrated by its application to, for example:

- promoting efficient use of land,
- allocating renewable resources,
- protecting lands, resources and features of special value,
- resolving competing demands for land according to predetermined criteria,
- encouraging and facilitating environmentally sound economic development,
- promoting sustainable urban development.

The best achievements of Canadian land use planning compare favourably with those of any other country. Canada could have perhaps the best land use planning system in the world if each of its jurisdictions were to adopt and adapt the outstanding Canadian models for its own use.

Perhaps the most serious obstacle is attitudinal: the perception of land as property and commodity, and widespread ambivalence towards planning in the public sector. Also the very diversity of land use planning activities obscures the particular approach and principles which constitute their common core, and obscures also their collective achievements.

Full realisation of the potential of land use planning as a tool for the achievement of sustainable development calls for changes in the way in which it is currently employed. Such changes are likely to occur, however, only after we change our perception of land in relation both to "the environment" and to society and the body politic. Specifically, what is called for includes:

- First and foremost, recognition of land as integral to the "life support system" of the species, so that we think of it in terms of stewardship rather than of exploitation. Here we have much to learn from our aboriginal compatriots who perceive earth, air, water and living things as having an essential unity.
- Recognition by governments of land policy as basic, and as important as, say, health or education policy.

 Rethinking of professional purpose, responsibilities and ethics by those who actually practise and teach land use planning.

Adoption of sustainable development formally as a goal of land use planning at the federal, provincial and territorial levels of government is the first and fundamental step towards fully effective use of land use planning for sustainable development – because land use planning is only a tool to be used for the ends decided on by society.

Development of sustainability-oriented national land use policies should follow from this. While a national land use policy is not needed to put such policies into effect, the fragmentation of responsibility for land use and the environment characteristic of most governments in Canada would have to be overcome.

Greatly improved integration of land-related programs within a single policy framework is a primary need. This should include the explicit recognition of municipal planning as an instrument of land policy, and the adoption of the appropriate procedures supported, where necessary, by legislation. These measures would be facilitated by the adoption of regional systems expressly designed to serve land use planning purposes.

In addition to its broader responsibilities for major aspects of the ecosystem such as air quality, water management and fisheries, the Government of Canada has four specific areas of responsibility with regard to land policy and planning:

- To ensure that a coherent, effective and equitable system of land planning and management is not neglected in the processes of establishing aboriginal rights with regard to land and resources in northern Canada, and devolving new powers to the territorial governments.
- To maintain and expand the federal government's traditional and irreplaceable role as a source of information on land and land use planning in Canada.
- To ensure that its own land-related programs promote and reinforce sound land use planning, and where applicable are carried out within a framework of planned land use.
- Above all, to provide the leadership needed to establish sustainability-oriented land policies as the basis of land use planning throughout Canada.

HISTORY OF THE CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council (CEAC) was established under ministerial authority, as a result of a 1972 Cabinet Decision to provide the federal Minister of the Environment with independent, informed advice on problems and policies regarding the environment. It was envisaged that the Council would serve as an alternative source of advice to that provided by Environment Canada and by specific nongovernment interest groups. Although the terms of reference were given in very broad and general statements, the holding of public hearings was specifically excluded.

Initially, the 12-16 members of CEAC were largely drawn from the academic and scientific community and their relatively ready access to resources of the university community, combined with some measure of control over their own time, contributed greatly to the Council's work program. Subsequently, membership was broadened to make it more representative of a wider cross-section of environmental interests. This led to changes in working procedures, including greater emphasis on commissioning special studies through external contracts. External contracts are also used when the Council does not have specific expertise and wants to be informed on selected issues.

Throughout its history, CEAC has been supported by a small secretariat drawn from the staff of Environment Canada. The Department has also provided accommodation for the secretariat as well as all the normal office support services (telephone, typing, printing, etc.). Previously, CEAC's operating budget was prepared by the Council, approved by the Minister and submitted to Environment Canada administration for inclusion in the departmental estimates submission. Thus, final approved budgets were controlled by Treasury Board directives and, to a large extent, the Environment Canada administration interpretation of the Treasury Board directives. In recent years negotiations on CEAC's budget have been concentrated in three-way discussions involving the Minister, Deputy Minister and Council Chairman, a time-consuming procedure, especially in times of economic restraint.

From its early days CEAC made a significant contribution to the development of policies as the newly formed Department of the Environment took shape. Council studies led to the production of substantive reports which served both as sources of advice to the Minister of the day as well as documents for public information. Appendix 1 contains a statistical summary of the characteristics of work performed by CEAC, by fiscal year from 1983-84 to 1987-88, showing the number of outputs, the principal form of the output, the origin of the study, by whom the work was done, and the nature of the study. This tabulation serves primarily as background information rather than as a basis for predicting future activities. A further indication of the breadth and scope of CEAC's work is provided in the comprehensive listing of published papers and annual reports contained in Appendix 2, List of Publications.

During the late '70s and early '80s the focus of CEAC's attention shifted from responses to problems that it had identified and held to be urgent, to a much closer association with the problems and preoccupations of the Minister, while retaining its function as an independent adviser to the Minister. Notwithstanding this shift, the relationship between the Minister and the Council (and hence the perceived usefulness of the Council's work) has varied considerably with changing ministers and Council membership. Formal statements on the role of CEAC approved by the Minister in 1981 and again in 1984 are shown in Appendix 4 and Appendix 5 respectively. Bearing in mind the generalities of the original mandate, the varying relationships between different Ministers and the Council, and the changing patterns of environmental management, it is not surprising that the need for clarification of CEAC's role has been raised frequently during the past 10 years. Internal council concerns have related to such factors as the adequacy of the resource base for CEAC activities, the perceived independence of CEAC, the variability in the relationship between the Council and the Minister with changing ministers, and the pressures for a stronger environmental advocacy voice. Outside observers have also perceived a need for strengthening and for reforming the Council's role.

COMPARISON OF ROUND TABLES AND ENVIRONMENTAL ADVISORY COUNCILS

With the recent appointment in Canada of round tables on evironment and economy, there has been interest in comparing them to the environmental advisory councils. Obviously, there will be an overlap of interest in these two types of institutions, but it appears that there are different mandates and clients.

Since advisory councils sprang up independently of each other and have been active since the early 1970's, they differ a lot among themselves. The characteristics attributed to councils here are not necessarily present in all situations, or even to the same degree. This is simply a generalized comparison for use during the Assembly of Environment Councils of Canada at Halifax in September 1989.

Environmental Advisory Councils

- 1. Environmental advisory councils were established in the 1970's at the same time or shortly after departments of the environment were established.
- 2. Since they were established independently there is a lot of variety as to council size, the relationship with ministers, the amount of public input, and budgets.
- 3. Councils report to the ministers of the environment.
- 4. Generally councils operate on a confidential basis with their ministers, although some may have a highly visible public profile.
- Councils were established to provide an informed second opinion to their ministers as a balance to advice from their departments and other sources. This includes advice on sustainable development.
- 6. Several councils have a statutory base, and one, Nova Scotia, has a quasi-judicial function.
- 7. Resources devoted to councils vary significantly between jurisdictions, but tend to be modest in amount.
- 8. A secondary function of many councils is to raise public awareness about environmental issues, primarily through publications. (There is a possibility for conflict between the confidential advice to the minister role and the public information role.)

Round Tables on Environment and Economy

- Round tables have been (are being) established in 1988-89
 as a result of a recommendation in the report of the
 Canadian Council of Resource and Environment
 Ministers' National Task Force on Environment and
 Economy.
- 2. Since round tables are relatively new and are all following the guidelines of the CCREM Task Force report, they are very similar thus far.
- 3. Round tables report to the first ministers.
- 4. Round tables are expected to operate in the public eye and have a public reporting role with respect to their deliberations and advice.
- 5. Round tables were established to provide advice on environment-economy linkages, and to promote environmentally sound economic development.
- 6. Round tables, so far, do not have statutory bases.
- 7. Resource levels devoted to round tables are still being determined in many jurisdictions, but tend to exceed the resource levels devoted to councils.
- Round tables will raise public consciousness about sustainable development, and are actively pursuing school curriculum development and mass media approaches.

Note: This is an edited version of a discussion paper prepared by the Council for use at the 1989 Assembly of Environment Councils of Canada.

- Mandate is to advise the minister on impending issues and problems in the environmental field on social and economic trends and their environmental implications and on principles and priorities related to long-term resource/environmental management.
- 10. No cabinet ministers as members.
- 11. Environmental expertise, or at least a demonstrated strong environmental commitment and interest, is a criterion for membership.
- 12. Advice is addressed primarily to one minister/agency, the environment department.
- 13. All functions of the environment department may receive attention, including policy.
- 14. Because of the professional/expert focus of council members, they often write reports themselves rather than delegating work to consultants or the secretariat.
- 15. The advice of councils is seen as primarily single sector as they are seen as advocates for the environment.
- 16. Advisory councils have existed for some time so that they have developed standardized ways of operating.
- 17. Most councils have a small membership (approximately 10 members), but can be very large (Manitoba can have up to 50).
- 18. Miscellaneous:

Councils contribute to the preparation of environment ministers for their participation on round tables and their role in the sustainable development debate.

- Mandate is to influence decision-makers to bring the environment and continued economic development into harmony rather than promoting either economic growth or environmental protection in isolation.
- 10. Cabinet ministers are members.
- Membership consists mostly of senior decision-makers from different sectors of society, and other stakeholders. Most members are not environmental experts.
- 12. Advice is addressed to the whole government, and to industry, educational institutions, etc.
- 13. Emphasis is on policy and strategy development.
- 14. Members are appointed because of their influence and seniority, and are unlikely to be as personally involved in analytical work as council members.
- 15. Round tables are not environmental advocates since they are multi-sectoral.
- 16. The round tables are untested institutional structures which, while communicating among themselves, have not yet standardized their operations.
- 17. Round tables generally have approximately 20 members.
- 18. Miscellaneous:

As a follow-up to the CCREM Task Force, many round tables have been asked to develop conservation/sustainable development strategies.







REVIEW OF ACTIVITIES





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Canadian Environmental Advisory Council Conseil consultatif

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Requests for Council publications should be addressed to:

The Enquiry Centre Environment Canada Place Vincent Massey 351 St. Joseph Boulevard Hull, Quebec K1A 0H3

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Ce rapport est disponible en français

CANADIAN ENVIRONMENTAL ADVISORY COUNCIL

The Canadian Environmental Advisory Council (CEAC) is a body representing a cross-section of Canadians who are knowledgeable and concerned about the environment. It operates in a confidential advisory capacity to the federal Minister of the Environment. It provides the Minister with an alternative source of advice to that provided by the Department of the Environment (Environment Canada) and other federal agencies, and to the advice provided by specific interest groups. The Council's public role, in terms of activities such as the publication of reports, is secondary to its primary function of providing advice to the Minister of the Environment.

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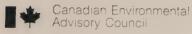
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Ottawa, Canada K1A 0H3

Minister of the Environment Ottawa, Canada

Dear Minister:

It is with great pleasure that I submit to you the Council's Review of Activities for the period April 1, 1990 to March 31, 1991. During this period the Council continued its efforts to serve you and the Canadian public through its studies and advice on environmental concerns. We were particularly pleased to complete the research on a major study on protected areas that we hope will stimulate action on this essential part of the sustainable development agenda.

On behalf of all Council members, I would like to convey our best wishes and our commitment to future service.

Dr. Robert Page

Chairman



CHAIRMAN'S REMARKS

With public interest in the environment at a high level, the 1990–1991 period was another year of vigorous activity for the Canadian Environmental Advisory Council. Our activities included oral and written advice to the Minister, public reports, and ongoing interaction with the Department of the Environment and the Canadian public.

The Council put considerable effort into the report A Protected Areas Vision for Canada, which presents a variety of ways that private- and public-sector parties can contribute to protecting habitat. Jim Butler of Edmonton provided the editorial leadership for this project.

Under the direction of Shirley Conover of Halifax, another Council work group has been breaking new ground on the methodology of environmental indicators. This is a most challenging field, essential for environment-economy linkages and the eventual implementation of sustainable development. During the year we also had several dialogues with the Minister and the Deputy Minister on the evolving content of the Green Plan. The "vision" portion of our advice to the Minister appears as Annex E in this Review.

Our work on environmental and health aspects of the nuclear industry continued under the direction of Doug Cook of Toronto. This is a complex and difficult field, and we believe there is a need for some reasoned commentary on the scientific literature.

Other areas of interest to the Council included the development of a plan for ecosystem research at Canadian universities, environmental regulation and enforcement, biodiversity, science and technology, and global climate change. In addition we continued our monitoring of priority chemical listing under the Canadian Environmental Protection Act (CEPA), and the evolving work on the new Environmental Assessment and Review Legislation. We also launched a new study, on ecotourism, headed by Diane Griffin of Prince Edward Island.

Thus the year has been a busy and effective one for our Council in working with the Minister and his staff on a variety of pressing environmental issues.

— Bob Page, Chairman

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COUNCIL OPERATIONS

The members of CEAC carry out the work of the Council with the support of a small permanent staff. Much of the business of the Council is conducted through periodic meetings and various forms of telecommunication. This section of the Review briefly describes the operational aspects of the Council's program. The substantive activities are described in the following section, Council Studies and Advice.

Meetings

There were six meetings of the full Council during 1990-91, and three meetings of the Executive Committee. In addition, two special meetings with the Minister of the Environment were held to review priorities and to discuss issues of special concern to the Minister. The formal meetings of the Council and the Executive Committee were augmented by meetings and telephone conference calls among members who were responsible for guiding specific studies.

The Council continued to schedule its meetings in various parts of the country in order to gain first-hand knowledge of local and regional environmental issues and perspectives. Of the nine formal meetings, three were held in Ottawa. Other meeting locations included: Kananaskis (Alberta), St. John's, Winnipeg, Toronto, and Vancouver. The meeting in Winnipeg coincided with the annual assembly of environment councils of Canada.

Of particular note were two workshops held during the year: a two-day workshop in Ottawa in July 1990 on indicators of ecologically sustainable development, and a workshop in August 1990, also in Ottawa, on ecosystem research.

A number of special briefings were arranged during Council meetings to keep members informed on developments in the environmental field. Briefings of particular note included: by the Chief Executive Officer of the Environment Council of Alberta on the framework for action on the Alberta Conservation Strategy; by the President and Chief Executive Officer of the International Institute for Sustainable Development; by the Chairman of the Quebec Conseil de la conservation et de l'environnement; and by

Dr. Gordon McBean of the University of British Columbia, on global warming.

Membership

The Council was strengthened during 1990-91 by the appointment of three new members. Because there were no retirements during the year, the new appointments brought the total membership to 12 by year-end.

The new members appointed during the year were:

- Ms. Linda Duncan
 Dalhousie University
 Halifax, Nova Scotia
- Dr. Ilona Kerner Quebec City, Quebec
- Dr. Jennifer M. Shay University of Manitoba Winnipeg, Manitoba

Two appointments related to current members were made during the year: Mr. Doug Cook was appointed vice-chairman, and Ms. Diane Griffin was reappointed as a member for a further three-year term. Dr. Hélène Connor-Lajambe, who had been serving as a vice-chairperson, continued as a member on a correspondence basis following her appointment for a three-year term as the Energy Advisory in the Environment Directorate of the Organization for Economic Cooperation and Development (OECD) in Paris, France.

A complete list of members as of 31 March 1991 appears in this Review as Annex A.

Publications

As noted in previous Reviews of Activities, most of the Council's work culminates in advice to the Minister by letter or through presentation and discussion. Only a few of the Council's studies involve the production of public reports.

Four of the studies underway during 1990-91 were expected to result in published reports. One of the reports

was completed and published during the year. Two others were in final manuscript form by year-end. The published report was:

Indicators of Ecologically Sustainable
Development: Economic, Ecological, and
Decision Theories

This is the first of three publications planned from the Council's study on indicators of ecologically sustainable development. It includes three background papers that were prepared to stimulate discussion at the July 1990 workshop on indicators organized by the Council. Two of the papers describe major schools of thought in economics and ecology, and discuss how the different schools and concepts propose to deal with sustainable development. The third paper examines decision theory and its possible impact on the design and choice of indicators.

The Council published a second document during the year: the *Review of Activities 1989-90*. The style and content of the 1989-90 Review was modified somewhat from previous Reviews, with a new "Features" section added to allow past and present members of the Council to provide personal views and thought-provoking articles on subjects of interest to them.

A complete list of the Council's publications appears in this Review as Annex B.

Administration

The administrative highlight of 1990-91 was the move of the Council office from the 25th floor at 10 Wellington Street in Hull to the ground floor at 116 Lisgar Street in Ottawa. The Council had struggled for several years with crowded facilities that hampered effective and efficient operations. The move provided the Council with adequate office space and significantly enhanced the staff work environment.

The Council's support staff was brought to the full complement of four during the year with the appointment of Ms. Donna Gray as Administration and Communications Officer.

The Secretariat's workload was exceptionally heavy during 1990-91 because of the relatively large number of studies underway and the relocation of the office. The staff continued their normal activities in support of the Council, including organizing meetings of the Council, the Executive Committee, and working groups; organizing workshops; researching and gathering information on subjects under study by the Council; editing reports and preparing them for publication; managing contracts; and performing other support functions.

COUNCIL STUDIES AND ADVICE

This section of the Review describes the major projects of the Council during the year 1 April 1990 to 31 March 1991. While the projects are described under separate headings, they are linked at various conceptual and practical levels. The Council approaches environmental issues as multisectoral and multidisciplinary in nature; hence, linkages among Council studies are important considerations.

A Protected Areas Vision for Canada

Preliminary work on a major study on protected areas was described in the 1989-90 Review of Activities. The research on the study was completed during 1990-91, and the report, A Protected Areas Vision For Canada, was ready for final editing, translation, and printing at year-end.

The report defines protected areas as natural areas protected by legislation, regulation, or land-use policy that ensure the protection of flora and fauna within their natural habitat, and that exclude commercial resource activities such as forestry, mining, agriculture, and hydro-electric power development. Included within the definition are: ecological reserves; national, provincial, and territorial parks; wildlife management areas; and other designated areas, including private land holdings.

As noted in the 1989-90 Review, the Council had undertaken several studies on protected areas in the past, but these studies focused on national parks. The current study is directed at the full range of protected areas including, but not limited to, national parks. It was prompted by the realization that the high rate of land allocations and resource development commitments in Canada could, by the year 2000, make the establishment of new protected areas difficult, if not impossible, in many of the country's highest quality natural regions. The study builds upon the reports of several national and international bodies which, together, establish the basis for a clear objective: the completion of a network of protected areas representing a complete range of the nation's diversity of natural land-scapes and seascapes.

Indicators of Ecologically Sustainable Development

Preliminary work on this project was described in the 1989-90 Review under the title Sustainable Development Indicators. As noted in that Review, the Council initiated this project after discussions with the Minister following the meeting of the Group of Seven (G7) summit nations in June 1989. That meeting dealt, in part, with the development of indicators as a contribution toward integrating environmental and economic decision making.

Initially, the Council explored the theoretical underpinnings of the economic, ecological, and analytical systems that define indicators. The Council organized a two-day workshop in Ottawa in July 1990 that brought together a group of 40 knowledgeable economists, ecologists, and senior decision makers who represented various schools of thought in economics and ecology. In preparation for the workshop, the Council commissioned three background papers:

- Indicators of Sustainable Development: Some Lessons from Capital Theory
- The Concept of Ecological Integrity, Alternative Theories of Ecology, and Implications for Decision-Support Indicators
- · The Role of Indicators in the Decision Process

The workshop included an initial discussion on the conceptual foundations of economics, ecology, and decision making, followed by more practical discussions on taxation, measurement, and investment. In these discussions, the participants identified five areas of particular significance: regenerative capacity, pricing and taxation, ethics, worst-case scenarios, and natural capital.

The workshop provided valuable practical insights, identified areas for further study, and advanced the state of knowledge and understanding on the subject of indicators of ecologically sustainable development. The Council provided the Minister with a preliminary report on its findings in January 1990, just prior to the Minister's participation in a meeting of OECD environment minis-

ters at which the subject of environmental indicators was discussed.

The first of three scheduled reports on indicators, Economic, Ecological, and Decision Theories, was published during the year. This report contains the three background papers prepared for the July 1990 workshop. Extracts from the report appear in this Review as Annex D. Synthesized Workshop Proceedings, a report on the workshop, was nearing completion at year-end. Towards New Fundamentals, also nearing completion at year-end, will be a distillation of the findings of the workshop and the Council's previous work on indicators. It identifies five fundamentals that should form part of the future agenda for developing indicators relevant to policy analysts and senior decision makers.

The Environmental and Health Impacts of the Nuclear Industry

This study was originally scheduled for completion in 1990-91. While some progress was made during the year, additional time had to be devoted to it, and the completion date was rescheduled into 1991-92.

The 1989-90 Review described the initial steps that led to the Council's decision to undertake the study of the nuclear industry. In the aftermath of the report of the Advisory Committee on Energy Options, the Council recognized that the relationship between energy policy and the environment was one of the central issues in sustainable development. The Council developed a framework for a series of studies on the various energy sources, but concluded that completion of the series all at one time would be beyond available resources. The nuclear industry was selected as a pilot study to be undertaken by the Council, with the suggestion that others undertake similar studies of other energy sources. The nuclear industry was chosen in part because increasing concern over climate change has led to a renewed interest in the nuclear option. and there is a need to assess the health and environmental risks associated with nuclear power before major decisions are made.

The study will provide an overview of the current state of knowledge of the health and environmental impacts of the nuclear industry. The main findings will be described in a balanced, technically sound, and informative manner. It is hoped that the report will serve as a useful reference for all parties engaged in the energy debate.

The Green Plan

The initial involvement of the Council in the Green Plan process came just before the end of the 1989-90 fiscal year, with a briefing by the Deputy Minister of Environment Canada on A Framework for Discussion on the Environment, the document prepared for public consultations. The Council subsequently provided advice to the Minister on the plans for public consultations.

The Council continued to monitor the public consultation process during the early part of 1990-91, and several members of the Council attended consultation meetings. Two of the Council's regular meetings with the Minister during the year discussed aspects of the Green Plan, although Council members did not have access to specific details of the draft plan.

Following the public consultations on the Green Plan, the Council prepared a working document that included recommendations on the possible contents of the Plan. In particular, the Council urged that the Green Plan incorporate a vision of sustainable development to be shared by all Canadians. The "vision" portion of that working paper appears in this Review as Annex E.

The Council made a number of recommendations regarding the content of the Green Plan. It urged that commitments be made to four high-priority areas: enforcement, biodiversity, science and technology, and global climate change. CEAC also suggested that global issues, such as the easing of international tensions, be considered in the final Green Plan to make it more comprehensive. Other recommendations included: development of foreign policy related to the environment and sustainable development; completion of the national parks system; integration of land use planning with environmental impact assessment and with conservation and sustainable development strategies; revitalization of science and technology, particularly with regard to multidisciplinary ecological research and technologies supporting sustainable development; and development of a leadership role on climate change.

Environmental Achievement Awards

The Council served again as the final judging panel on the Environmental Achievement Awards. The awards program was initiated in 1989 by the federal Minister of the Environment. In announcing the 1990 program, the Minister stated that the awards were intended "to celebrate the efforts and commitment of Canadians from all walks of life who work to protect and restore our environment."

The awards were again offered in six categories, five of which were judged by the Council. Nominations were submitted to Environment Canada and then referred to the Council for judging. Presentations were made to the winners by the Governor General during a ceremony at Government House on June 6 during Environment Week.

The categories in which awards were offered, and the 1990 winners, were:

- Nonprofit Organization for a nonprofit, nongovernment group that has made an outstanding contribution to the protection of Canada's environment.
 - 1990 award Ducks Unlimited, for its contribution to wetlands conservation since its inception in 1938, and with special acknowledgement of its new Prairie Care program.
- Outstanding Communications for Environmental Awareness — for an author, journalist, broadcaster, or film maker whose work has significantly broadened Canadians' awareness of environmental issues.
 - 1990 award David Suzuki, scientist and communicator, for his continuing efforts to raise environmental awareness through articles, newspaper columns, books, and television programs.
- Corporate Environmental Leadership for innovative and/or exemplary environmental conduct by a Canadian corporation, institution, or association.
 - 1990 award La Société Laminage Perma Ltée, for its performance in producing a high-quality product from wood scraps in a clean and environmentally conscious workplace, with minimal impact on the environment.
- 4. Lifetime Achievement for an individual Canadian whose lifetime dedication to the environment is a source of inspiration.

- 1990 award Dr. Andrew Thompson, a long-time champion of environmental protection, particularly in Canada's north. He has been active in public interest groups and professional associations, and played a key role in several major inquiries and conferences.
- 5. Environmental Leadership by a Municipality for an innovative and/or exemplary environmental policy, project, or activity by a municipality.
 - 1990 Award the Regional Municipality of Sudbury, for its leadership since 1978 in rehabilitating extensive areas of environmentally degraded land, through soil improvement and planting of vegetative cover, including one million trees.

Nominations in a sixth category, Environmental Science Fair Project, were not judged by CEAC.

Round Tables on Environment And Economy

The Council continued its interest in, and support for Round Tables on Environment and Economy during the year. The establishment of round tables was recommended by the National Task Force on Environment and Economy in 1987. They were to serve as forums for senior decision makers from all sectors to work together toward integration of environmental and economic matters. By the end of 1990-91, round tables had been established by the federal government and by all provincial and territorial governments.

The Chairman of CEAC gave the keynote address to the first joint meeting of the Round Tables on Environment and Economy in Winnipeg in April 1990. In his address he noted,

... the challenge of sustainable development requires us to mobilize as never before the political will of the country to deal with the urgency of a series of environmental challenges eroding the life processes and the economic potential of the planet.

The full text of the address appears in this Review as Annex C.

The Chairman also gave the opening address at the first meeting of the Alberta Round Table. In addition, the Council's Executive Director was invited to attend the first meeting of the Northwest Territories Round Table on Sustainable Development to assist in establishing goals and objectives.

Ecosystem Research

The Council's initiative on ecosystem research resulted from discussions held during the July 1990 workshop on indicators of ecologically sustainable development. This project was also given impetus by the public consultation meetings on the Green Plan, in which there was strong support for greater emphasis on policy making based on an ecosystem approach to scientific research and socioeconomic analysis. Current scientific research tends to be structured around individual scientific disciplines and focused on specific environmental issues. Increasingly, the need is for ecosystem research that takes human activities into consideration within an ecological framework.

A one-day workshop, involving leading ecologists and scientists from inside and outside of government in addition to members of the Council, was held in Ottawa in August 1990. The workshop addressed the topic "Institutional Options to Apply Ecosystem Research in Policy." Discussion topics included: the current and needed levels of knowledge about ecosystem integrity, the current strengths and current or foreseeable constraints affecting ecosystem studies, and the institutional options available to elevate and apply ecosystem research and analysis in making policy. During the latter discussion, workshop participants examined the feasibility of expanding or revising existing institutional programs, developing a network of ecosystem researchers and research units, establishing expert working groups, developing ecosystem synthesis and advisory capacities within Environment Canada, and establishing an entirely new institutional structure. There was a preference for the latter option the concept of an "Ecosystem Institute of Canada" although participants felt that some of the other options would be complementary.

When it was announced in December 1990, the Green Plan stated,

... the federal government is launching a five-year environmental science and technology action plan that will: promote new directions in the scientific exploration of both domestic and global environmental problems, the goal being an integrated ecosystem-based understanding...

Following the decision that ecosystem research would be funded through the academic granting councils, CEAC recommended creation of a cooperative management structure within those councils to integrate and enhance their capability to support ecosystem research.

Ecotourism in Canada

The relationship of tourism and the environment was identified by the Council several years ago as a subject for future study. It was apparent that, while the natural environment is the basis for much of the world's tourism, poorly planned and managed tourism developments, and excessive concentrations of visitors in prime tourism areas, can damage the qualities of the environment that attract tourists. On the other hand, ecotourism has the potential to be one of the most important tools for environmental conservation in the future.

This subject became the focus of several conferences and workshops in 1990, including the Globe 90 Conference on environmentally sustainable development. Also in 1990, the National Round Table on the Environment and the Economy launched a study on tourism and sustainable development.

The Council identified "ecotourism" as an area for study that would complement initiatives by other organizations, and also other Council projects such as the report A Protected Areas Vision for Canada. Terms of reference were prepared for a study to define ecotourism, identify the major issues and concerns, develop a code of ethics that would seek to maximize economic opportunities within the appropriate ecological and social constraints, and prepare policy recommendations. The terms of reference were completed by year-end in preparation for a study to be undertaken in 1991-92.

ASSEMBLY OF ENVIRONMENT COUNCILS OF CANADA

The 14th Assembly of Environment Councils of Canada was held in Winnipeg on September 19-22, 1990. The annual assemblies have been held, with a few exceptions, since 1975. They provide an opportunity for the environment councils to exchange information, share experiences, and build support for new ideas and concepts.

The 1990 Assembly was hosted by the Manitoba Environmental Council. In addition to Manitoba, participants attended from British Columbia, Alberta, Saskatchewan, Ontario, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland, and the federal government.

The theme for the Assembly was "Environmental Impact Assessment — The State of the Nation." Several participants provided background papers that described the current status of environmental impact assessment (EIA) legislation and activity in their jurisdictions. The discussions were launched by two keynote speakers: Mr. Ray Robinson, Executive Chairman of the Federal Environmental Assessment Review Office; and Dr. Tom Owen of Intergroup Consultants Ltd. The subject was explored in depth during three concurrent workshops and a final plenary session.

One of the workshops focused on the relationship of environmental impact assessment to land use planning, and on interjurisdictional considerations. The questions addressed in this workshop included:

- Environmental impact assessment as part of a regional land use planning process
- Involvement of neighbouring jurisdictions when environmental impacts extend beyond provincial, territorial, or national boundaries

- Responsibility for interjurisdictional assessments within Canada and on an international basis
- Harmonization of EIA processes

The workshop on the role(s) of environmental impact assessment addressed a number of basic questions, including:

- The purpose of EIAs
- The range of decisions to which EIA should be applied, and the timing
- The level of EIA according to the type and extent of the project or policy
- The requirement for EIAs compulsory, including legislated requirement, or discretionary; and the place of exemptions and alternative processes

The workshop on process and monitoring dealt with several challenging issues, including:

- · Minimal basic requirements for EIAs
- The role of the public, including timing, process, funding, etc.
- The role of the proponent
- The role of the media
- The need for monitoring and evaluating environmental changes as follow-up to an EIA

No formal resolutions or recommendations were adopted at the Assembly.

FEATURES

The Council includes in each Review of Activities one or more noteworthy articles on the environment. Normally, the articles are selected from writings by current or former members of the Council, but contributions from other sources are considered. These articles are included in the Reviews to provoke thought and to share environmental insights. The articles appearing in this section represent the opinions and observations of the authors, and do not necessarily reflect the views of the Council.

THE FIRST ENVIRONMENTALIST: JOHN MUIR

by Jim Butler*

In the early spring of 1864, a tall, lean young man with reddish brown hair and beard and piercing blue eyes stood on the banks of the St. Mary's River separating Michigan from Ontario. Nearly twenty-six years old, he travelled light, with knapsack containing a single change of underwear, a notebook and pencils, a comb, brush, towel, soap, a small New Testament, a book of Robert Burns' poems. The frames of a plant press, still empty, were waiting for plants to be discovered in the Canadian wilderness.

His name was John Muir, and botany was his passion. He entered this nation with a unique enthusiasm for adventure, discovery, and travelling. He travelled "in glorious freedom around the Great Lakes (the shores of Lake Huron and Ontario) and wandering through innumerable tamarack and arbour-vitae swamps, forests of maple, basswood, ash, elm, balsam, fir, pine, spruce, hemlock, rejoicing in their boundless wealth and strength and beauty, climbing trees, revelling in their flowers and fruit like bees in beds of goldenrods."

He carried no blanket, and would bury himself in the leaves at night, lighting a small fire to keep off the chill. He walked at a pace few could keep up with, covering 25 to 40 miles a day when on foot, and on other occasions he hitched rides on provision ships. This allowed him to explore Manitoulin Island and brought him as far as Owen Sound in Ontario. He walked with large, loping strides, with his head bowed, intensely searching the ground for plants, sometimes stopping to study one with a lens more closely.

He lived largely on bread and an occasional home-cooked meal from a farmer's homestead, which he would pay for with cash or by doing chores. No one, including himself, could have guessed that this rugged and resourceful botany student would become the greatest conservationist and advocate for wilderness protection the world has ever known. A National Geographic book dedicated to Muir described him as "the wildest, the most active, the most self-reliant, and the most persuasive of all American naturalists." No single title or phrase is sufficient to fully describe him, although many have been used: Father of Yosemite, Saviour of the Sequoias, Timeless Priest of Nature's Shrine, Father of Glaciology, the Western Spearhead of the Conservation Movement, Father of the National Parks System.

His two years spent in the Canadian wilderness deeply influenced Muir at a formative time in his life and shaped his philosophy. The early Ontario experience was Muir's first taste of wilderness, and first true test of independence and self sufficiency.

It was also an important time of transition. In his letters to Emily Pelton and Jeanne Carr, he learned to write with the heart of a poet. Muir's nature writing began here in Ontario. His first published words ever concerned his emotions at the discovery of the Calypso orchid in the Holland River Swamp, south of Lake Simcoe. His account of the experience, written in a letter to Professor Butler, was forwarded to the *Boston Recorder*, which published it on December 21, 1866. Muir later recalled that his discovery of the Calypso was one of the two supreme moments of his life. The other was his meeting with Ralph Waldo Emerson in the Yosemite Valley on May 5, 1871.

The first national parks in the U.S. and Canada focused largely on protecting natural and scenic "curiosities," like hot springs, geysers, and postcard scenes. Muir was instru-

^{*} This essay appeared in the Fall 1989 issue of *Borealis*. Dr. Butler is a professor of wildlands conservation in the forestry department of the University of Alberta. He is a member of the Canadian Environmental Advisory Council, and the senior editor of *Borealis*.

mental in promoting a dramatic shift in focus to the concept of preservation of large tracts of ecosystems, recognizing that the complex interrelationships of nature require large spaces to ensure their survival. In his words, "As soon as we take one thing by itself, we find it hitched to everything in the universe."

Muir marked the beginning of the era of the preservationist. He worked on presidential commissions to improve and formulate policies for sound forest conservation, but he also carried the concept of conservation (which implies "wise use" of a resource) to a higher plateau through the recognition that some of the finest examples of wild places must be left inviolate and must not be "used." On this distinction he parted ways with the well-known conservationist and forester, Gifford Pinchot, who contributed much toward improved forest management but failed to appreciate or understand the concept of wilderness preservation; rather, he favoured exploiting every wild place for its "usefulness." Pinchot, who greatly influenced Canada's forestry policy, lobbied against the establishment of the U.S. National Parks Service because it advocated the preservation of landscapes. And when Pinchot actively advocated the benefits of the dam that would drown the famed Hetch-hetchy Valley (inside Yosemite National Park, and a twin to the famous, scenic Yosemite Valley), Muir never spoke to him again.

In 1892 Muir helped found the first environment organization in North America, the Sierra Club, and was its first president, a position he held for the next 22 years, until his death in 1914.

Although the loss of the Hetch-hetchy Valley in Yosemite National Park (which was dammed and flooded to provide a water reservoir for San Francisco) was a defeat to Muir and the emerging conservation movement in North America, it was in other ways a catalyst to a public movement that would only continue to grow in strength, determination, and effectiveness, and Muir stood at the beginning of it all.

Naturalists honour Muir as the Father of Interpretation, and as the first to use the word "interpret" in the context of communicating the values of nature. Muir led numerous "interpretive" walks into the wild places of the Sierras and Yosemite. One of his followers wrote "Never was there a naturalist who could hold his hearers so well, and none had so much to tell."

The education of children was also very important to Muir. It was said that "his heart's best love went out to children" and that he should be called "the Children's Naturalist." As a storyteller of the wonders of nature, he shared time with children as few notable naturalists ever had. The world's recognition meant far less to him than it did to have won the heart of a child with one of his stories.

Through his writing, walks, and wilderness trips, Muir influenced a number of important people who spread his ideas and backed his policies. Enos Mills was so inspired by Muir that he dedicated his life to teaching the principles of nature guiding and is credited with the birth of interpretation programs in national parks. Referring to himself as the "John Muir of the Rockies," he later led the successful campaign to establish Rocky Mountain National Park in Colorado.

The great conservationist president Theodore Roosevelt, a naturalist in his own right, asked Muir to join him on some of his trips to wild places, including a brief retreat into the wilderness of Yosemite. Due in part to the influence of Muir, Roosevelt created five national parks and 23 national monuments during his term in office, and he added more than 148 million acres to the national forest system, a record for conservation and preservation that has not been equalled by any political leader.

Muir's lobbying led to the establishment of the National Park Service in the United States, and because of his time spent with Muir, Steven Mather, the first director of the U.S. National Parks Service, firmly entrenched preservation values as the fundamental purpose of national parks. Muir also played a role in the establishment of the foundation of our Canadian park system, for James B. Harkin, Canada's first Commissioner of National Parks, was a great admirer of Muir and used Muir's words to describe the purpose of national parks and the philosophy of wilderness preservation in formulating Canada's first national park policies.

During his life he became the saviour saint for the 2,500-year-old redwoods of the Pacific coast and the gigantic sequoias of the Sierra Nevada mountains. They were to Muir the "greatest of living things." They remain so today, largely due to him, and his words in their defence seem to whisper still in the shadowy recesses of their island groves.

The Life of John Muir

1838	Born in Dunbar, Scotland on April 21.
1849	Migrates with family to a farm in Wisconsin.
1861-63	Enrols as a student at University of Wisconsin.
1864-66	Travels in Ontario to botanize and work in Meaford at Trout-Jay mill.
1867	Eye accident in Indianapolis is catalyst to begin 1000-mile walk south.
1868	Arrives in San Francisco, visits Yosemite and Sierras for first time.
1869-73	While based in the Yosemite Valley, he explores the Sierras.
1871	Meets Emerson in Yosemite as a guide and mill operator.
1871-72	Begins to write articles for newspapers and magazines.
1879	First trip to Alaska.
1880	Marries Louie Wanda Strentzel of Martinez. They have two daughters.
1890	At death of Dr. Strentzel, Muir moves to "Big House," currently preserved as John Muir National Historic Site.
1892	Helps establish Sierra Club, becomes first president.
1894	First book published, The Mountains of California.
1896	Visits Trout Hollow in Meaford for a brief reunion with Trout family.
1897	Muir visits Alberta as far as Banff, with Sargent and William Canby.
1898	Muir travels into Quebec, from Montreal to the St. Law-rence River.
1903	Guides Theodore Roosevelt through Yosemite.
1903-04	Embarks on world tour to study trees with Professor Charles Sargent.
1905	Wife, Louie Wanda, dies.
1908	Hetch-hetchy battle in full swing.
1909	Tours Grand Canyon and Yosemite with John Burroughs.
1912	Muir makes his final visit to his beloved Yosemite in July.
1913	The battle to save the Hetch-hetchy is lost. Retreats to Martinez to turn Alaska notes into his ninth and final book.
1914	Dies of pneumonia on December 24, at the age of 76, in hospital at Los Angeles.

In spite of the fact that he found writing a laborious and uncomfortable undertaking, he was the author of nine books and so many letters and articles for newspapers and magazines that it took 179 pages to list over 500 references in a hard-cover bibliography published in 1986. Muir wrote slowly, hesitating over his choice of words. And he was delighted whenever he was rescued from his work by a visitor who dropped in to talk. He wrote not for the satisfaction or increased revenue it gave him, but for the impact and breadth of influence that writing provided. He once wrote, "A man in his books, may be said to walk the earth long after he has gone."

However, despite the importance he saw in writing books, Muir held tight to a competing priority. He put off writing books until he was too old to climb the mountains and only two were written by the time he was 70. To a friend who was assisting him with his *Travels in Alaska* book, he said, "To get these glorious works of God into yourself — that's the thing; not to write about them."

Among his close friends were some of the best-known naturalists, philosophers, and politicians of the time, including John Burroughs, Asa Gray, Theodore Roosevelt, and Ralph Waldo Emerson. He delighted in conversation with them, even if at times his zeal for talking made the discussion rather one-sided. He was warm and made friends easily. He enjoyed a stimulating intellectual argument and rarely proved the diplomat once a debate was under way. In one such exchange, John Burroughs said, "I guess you don't think I know much about geology," and Muir replied, "Johnnie, if all you know about geology were thrown into the ocean it wouldn't make a splash bigger than a raindrop!"

Although he failed to complete his degree at the University of Wisconsin, that institution later presented him with an honourary Doctor of Laws degree, which he travelled east to proudly accept. Further honourary degrees were conferred on him by Yale, Harvard, and the University of California. Harvard University offered him a

chair of Science which he refused because he would not leave his beloved Sierra Mountains.

He also proved to be a remarkable inventor, and, as he once said, he could have been a millionaire, "but elected instead to become a tramp."

Muir's life style was always consistent with his philosophy and belief systems. He allowed many a hungry mosquito to depart unharmed. During his early days in California, the lumber mill he operated in the Yosemite Valley was never fed a tree that had been cut. He would only use wind-fallen trees as a source of lumber.

He valued his time and freedom, feeling sorry for people who limited their stay in Yosemite to but a single day because they had allowed themselves to become "time poor" in their pursuit of wealth.

Muir preferred to be "time rich." Like Saint Francis of Assisi, he believed that animals were our brothers. To Muir sport hunting was "murder business." He never

carried a gun over all the years he hiked, for he cherished all forms of life. The streams were friendly companions, and the "flower people" seemed to lift their faces as he walked by. When he mourned for the forests of Hetch-hetchy, he called them the "tree people" and simply commented that the rest of society "will see what I meant in time."

While contemporaries like Henry David Thoreau recognized the value of wilderness, only Muir truly "lived it." Even his admired friend John Burroughs preferred to keep wilderness at an arm's length, in favour of the comforts of civilization. Muir once commented that all he needed to do to get ready for an expedition was to "throw some tea and bread in an old sack and jump over the back fence."

Both Thoreau and Burroughs largely avoided the unpleasant political confrontations that are associated with environmental activism. Muir disliked it as well, yet entered the arena as a formidable opponent against those whose narrow utilitarian views threatened the future or integrity of wild places.

While men like Thoreau and Burroughs were largely content to remain within the boundaries of their home region, Muir was very much a

The Name of John Muir

The name of John Muir is commemorated from coast to coast in the United States, but only once in Canada—on a provincial historic plaque that was erected on August 14, 1966, outside Meaford, Ontario, overlooking the Beaver Valley.

A number of places have been named for him in the United States, including Muir Lake, Muir Knoll, and Muir Park in Wisconsin. In California he was voted the "greatest figure in California history" by the California Historical Society. And there are more places named for him in that state than for anyone else except George Washington. Some of the places include Muir Woods National Monument, John Muir National Historic Site (his home in Martinez, California), Mt. Muir, Muir, Muir Peak, Muir Gorge in Yosemite, Muir Pass in King's Canyon National Park, and Muir Crest and Muir Grove in Sequoia National Park. There are the John Muir Trail, John Muir Parkway, John Muir College in Pasadena, and in the spin-off of private enterprise developments in Martinez, a motel, a bank, a shopping centre, and even a real estate agency. The Santa Fe railroad named one of its stops Muir Station, and during World War I, a liberty ship was christened the SS John Muir.

In national parks outside of California, you can find Muir Creek in Glacier National Park (Montana), Camp Muir on Mount Rainier, and, of course, Muir Glacier and Muir Inlet in Glacier Bay National Monument, Alaska.

Muir has been honoured in the scientific taxonomy of at least four species. A subspecies of pika, first discovered in Yosemite National Park, was named Ochotona princeps muiri. A subspecies of butterfly, Callophrys nelsoni muiri, is indigenous to the coastal range of California. His close friend, the great botanist Asa Gray, further honoured him by naming two new species of plants after him: Erigeron muiri from the Arctic and Ivesia muirii from Yosemite. A form of mineral exists that has been named muirite. He is honoured on a postage stamp, and the state legislature of California has officially proclaimed his birthday as "John Muir Day," which is celebrated annually.

citizen of the planet. At 29 years old, when he undertook his famed 1,000-mile walk from Louisville, Kentucky to Cedar Key, Florida, he inscribed in the front of his journal the identity of its owner as "John Muir, Earth-Planet, Universe." Incredibly, he walked thousands of miles to visit nearly every corner of North America. Unknown to all but the avid student of Muir, his peregrinations embraced a respectable portion of the globe in the fulfilment of a childhood desire to be an explorer.

On seven different trips to and from Alaska between 1879 and 1899, he travelled through the inland passage of British Columbia, describing his encounters with native tribes, settlers, gold-rush opportunists, wildlife, flora, and the beauty of wild landscapes. "Forests densely packed in every hollow and over every hill and mountain. How beautiful it is How perfectly virgin it is," he said.

Using Wrangell, Alaska, as a base, in 1879 he explored the Stikine River in British Columbia. One of his trips included a 200-mile hike from Telegraph Creek to Dease Lake, then on to Cassiar. Today the Stikine Valley is frequently referred to as the "Grand Canyon of Canada," and the fight over its future is ongoing.

The battle to save the Hetch-hetchy Valley deeply weak-ened Muir, from having "attended Legislature, made speeches, explained, exhorted, persuaded every mother's son of the legislators, newspaper reporters, and everybody else who would listen to me." Following the announcement on December 19, 1913, of the final, irrevocable decision to flood the Hetch-hetchy Valley, he retired to his Martinez home (now preserved as John Muir National Historic Site near San Francisco, California), enjoying his grandchildren and working 15 hours a day to complete a book on his Alaska travels.

One morning, just over a year later, on the day before Christmas, the California sun poured in through the curtainless window of his upstairs corner bedroom adjacent to his "scribble den" as usual. Only on this morning the room was vacant. Muir had died in the hospital of pneumonia, after a summer of poor health. He was 76.

The manuscript of his Alaska travels lay nearly completed at his bedside. Elsewhere, scattered in piles in his "scribble den," were extensive notes for more than a dozen books he would never finish. Shortly before his death he had commented to a friend, "I have lived a bully life. I have done what I set out to do."

Through his writing and language Muir exalted the wild core of nature as none had ever before. In the assessment of T. H. Watkins, co-author of John Muir's America, it is neither the quantity nor the literary significance of his writings that gives them weight, but the quality of vision they represent; a vision deeply felt, carefully structured, and firmly based on direct experience.

By the end of his long and productive life, Muir had been described as "the most magnificent enthusiast about nature in North America and the most rapt of all prophets of our out-of-door gospel." It was from Canada that he first wrote, "I am captive, I am bound. Love of pure unblemished nature seems to overmaster and blur out of sight all other objects and considerations."

Canada was Muir's first wilderness. Its magic never left him. And through his books, more and more people continue to discover and become inspired by John Muir. Under his inspiration, Canadians are rallying in defence of their last relics of old growth and uncompromised wild places.

How to Find John Muir's Ontario Points of Interest

Trout Hollow, the site of the Trout-Jay mill and the Trout home, are technically described as Lot 12, Concession B, Township of St. Vincent. Drive 3.2 km west of Meaford, Ontario from Town Hall on Route 26. Turn left onto St. Vincent road, marked Concession 6 and 7, proceed for 3.8 km, then turn left onto a dirt road marked Lot road 12 and 13. Drive as far as you can, then walk until the cutline crosses the Big Head River. Walk upstream, through "Trout Hollow," until the dam abutments are conspicuous on both sides of the river. This was the mill site.

The John Muir historic plaque can be found by driving south on Route 7 from Meaford for 15.5 km. In a small park run by the Grey Sauble Conservation authority, there is a sign, located south of the parking area.

Surprisingly, Trout Hollow, near Meaford, Ontario, retains much of its natural integrity, and the Big Head River, which continues to quietly carve at its original course, is a favourite location for many fly fishermen. If ever a valley were worthy to be designated as the location for a nature centre dedicated to John Muir for the purpose of teaching the underlying magic of nature's wonders and the foundations of environmental protection, this is it. This, after all, is where Muir himself first came to grips with such concepts and stood at a crossroads in his life.

The Trout Hollow site is a rich opportunity, for Muir is very much a part of our Canadian heritage, and Trout

Hollow could be an important teaching landscape at a time when more attention to environmental education is desperately needed. As a concept, it needs a local champion. If one can be found, then perhaps future champions for environmental reform will pass through its valley and leave carrying with them some of its magic.

As one of his noted biographers, Linnie Marsh Wolfe, once said of Muir, "He does not need our tribute any more than do the trees and mountains whose soul-brother he was. But we of this machine age need him. Our children need him. It is good for us to do him honour and to heed his call."

THE ROLE OF EDUCATORS IN THE GREENING OF CORPORATE CANADA

by Tom Beck*

O wad some Power the giftie gie us
To see oursels as ithers see us!

- Robert Burns

That quote from Robert Burns has universal application. I believe that we all suffer from an inability to make an objective measurement of "oursels." I am sure that this is true of educators, particularly elementary and secondary schoolteachers, who seem to be unaware of the degree of positive impact they have had vis-a-vis environmental awareness and understanding.

There is, in my view, a direct correlation between the teaching in the schools during the late 1960s and early 1970s, and the strong environmental ethic of today's young adults. As I see it, this ethic is at the root of today's pervasive environmental interest and concern.

In this paper I have attempted to provide an outside perspective on the contribution made by educators. I have opted to examine the role of educators in relation to the corporate world rather than to the general public, because I have first-hand knowledge of some of the developments that have taken place. I can rely on personal experience gained as one of the first environmental specialists in the oil, gas, and mining industries. The oil industry is used in this article as the main bellwether of change, as, to some degree, is mining.

The Greening of Corporate Canada

My impressions from within industry in the 1960s can be summed up in a few words: the environment and the economy were two solitudes. The business equation of the day consisted solely of industry and related government departments, with no perceived need to balance the equation by adding environmental considerations. Expressions of environmental concern were not always appreciated; in fact, they were generally viewed as being opposed to industry or company interest.

The first moves toward environmental action by industry were prompted by disasters such as the Torrey Canyon and Arrow oil spills. But they were just remedial actions — clean-up of pollution. Engineered solutions were often inadequate or inappropriate, particularly in Canada's so-called "frontier" regions where petroleum and mining development could have dramatic impacts on the fragile northern environment.

As we entered the 1970s, professionals with environmental backgrounds were virtually nonexistent in industry. As a result of growing public concern and subsequent reaction by governments, individual companies, particularly those operating in the frontier regions, began changing the way they operated. Among other steps, they initiated public consultations on proposed projects, and adopted better land use practices.

The establishment in 1970 of the Northern Environmental Protection Board, chaired by Dr. Carson Templeton, is a specific example of this new approach. The Board (which was independent, although its costs were underwritten by Foothills Pipe Lines Ltd.) set the environmental research

^{*} This article is based on an address given by Dr. Beck to the Teachers' Winter Institute in Saskatoon, February 1991. Dr. Beck is Chairman Emeritus of the Canadian Environmental Advisory Council.

agenda and interpreted the results of studies for the evaluation of a proposed northern pipeline.

There were two events in 1974 of particular significance: the appointment of the MacKenzie Valley Pipeline Inquiry panel headed by Thomas Berger, and the inception of Canada's Environmental Assessment and Review Process (EARP). Both impressed on industry the need to take into consideration the environmental and social impacts of their actions, and to have environmental and social science expertise on hand. By the end of the decade, some companies, particularly the larger ones in the oil and gas exploration business, had added environmental sections or departments to their organizations.

The petroleum industry gave another form of recognition to environmental concerns during the 1970s: its powerful lobby groups, the Canadian Petroleum Association and the Independent Petroleum Association of Canada, both added environmental committees to their structures. The refinery sector of the industry also created the Petroleum Association for Conservation of the Canadian Environment (PACE), to address problems specific to that segment of the industry.

During the 1980s, industry's environmental management capability continued to develop, although it should be pointed out that this capability was generally limited to large, high-profile companies, and it was still seen to be far short of ideal by critics. Also, the economic downturn of the early 1980s resulted in what has been described as a disproportionately large cut in the number of environmental staff within the oil industry.

A number of companies such as Petro-Canada, Inco, Noranda, Dow, and Shell Oil, among others, developed environmental policies, and the environment became a topic for discussion in annual reports, thus directly expressing corporate interest in the environment to employees and shareholders.

Environmental audits came into vogue during the 1980s, paralleling the financial audit, long a staple of corporate life. Environmental audits are used to determine the environmental status or performance of specific segments of company activity. These audits are voluntarily undertaken by companies. Events such as Bhopal, Love Canal, and Chernobyl, and the need to ensure toxin-free land for

development on former industrial sites, underscore the value of environmental audits.

A classic stage of environmental acceptance in corporate boardrooms (and accounting departments!) developed during the latter part of the 1980s, with recognition of corporate environmental performance as a determinant for ethical investors. Companies with poor environmental track records are not seen as good investments by the new generation of "thirtysomething" green consumers who are now the driving force behind green mutual funds and RSPs.

Entering the 1990s, the changes are perhaps not as dramatic as they were at times in the 1970s and 1980s, but they are more apparent because more companies are espousing environmental interest, and the major resource companies that initially led the way have been joined by a much broader array of companies. Retailers in particular are capitalizing on the green consumer movement: Loblaws and the Body Shop, for example. In the process, these companies provide an opportunity to consumers for practical expression of their environmental concerns. Green consumers are, in my opinion, really driving the train, demanding less packaging, more substance, and less artifice in what they buy.

Industry has discovered the economic benefits of environmental consciousness. Northern Telecom, for example, has developed a money-saving, wide-ranging recycling and waste reduction program. Quaker Oats is reported to have saved more than \$1 million in its three-year-old waste reduction and recycling program. Even the far-flung corners of the country are benefitting from corporate environmental interest; for example, Dow Chemical has initiated a recycling program in the village of Pangnirtung on Baffin Island.

Financial support for environmental groups by industry has increased. One company I talked to plans a five percent increase in 1991 over their 1990 donations to environmental groups, and predicts greater support in the future. A clothing manufacturer and retailer, Mountain Equipment Co-op, is dedicating a percentage of sales, and Shell Oil has initiated a \$1 million fund to support environmental organizations. Environmental "education" as opposed to environmental "awareness" will, I predict, be a target for much of this support.

Some companies now have public advisory boards to provide guidance on environmental and social questions. But perhaps one of the most significant recent developments relates to environmental ethics: within some companies, environmental ethics have now matured to the point where their suppliers must have acceptable environmental standards or products.

The greening of corporate Canada has come a long way since the early 1960s. To ensure that the greening process continues, we need to look at the driving forces behind it.

The Catalysts of Change

The greening process that I have described did not result from one spark, one confrontation, one boardroom decision, or one action by an organization. Many groups and individuals played a role, and I want to offer a brief tribute to the main players: environmentalists, educators (more about them later), the media, our native people, industry (its efforts have been described above), international organizations, and governments.

They were the main catalysts, and the crucible was the period during the late 1960s and early 1970s when, for whatever reason, there was an explosion of grassroot protests on several issues: the peace movement, native rights, women's rights, gay rights, and, of course, environmental quality.

It is important, however, to look at events of recent decades in an historical perspective. The environmental movement was not born during this brief period of protest; its roots can be traced back through the early decades of this century. And one of the important considerations in looking at the growth of the environmental movement is the "ripple effect" — the direct and indirect influence exerted by a relatively small number of individuals and groups. We Canadians owe much to the individuals and groups who were labelled "environmentalists," and the "conservationists" and "preservationists" of earlier decades. They were a small percentage of the population, with minuscule financial resources, but the few committed themselves to the preservation of everybody's environment. They, and their organizations, are truly environmental stewards, and their influence rippled throughout our society.

The media deserve credit for the role they have played in consistently sensitizing the public to environmental issues. Although the media are sometimes maligned for lack of indepth reporting and sensationalism, these criticisms are minor compared to the early and sustained interest in environmental quality shown by the various media. Given the global nature of many environmental problems, and our growing reliance on the media for information, the media face a critical challenge in the years ahead: to not literally drop coverage of environmental issues until late in the day, as in the Gulf War, when they discovered that the war had horrendous environmental consequences.

Ironically, it took an environmental awakening to give the "immigrant" society of this country an appreciation of the traditional values long held by the people of Canada's First Nations. Native rights issues, with their underlying environmental ethic, served as a powerful force for action, particularly in the frontier areas that are the homeland to many native Canadians. People and the land go together; they cannot be separated, a lesson some first learned from the Inuit and the Dene people.

I believe that international organizations have had a significant impact on the greening process in Canada, simply because their predictions and recommendations were seen as authoritative and beyond the shadow of domestic political considerations. Three events stand out in my memory. The first was the historic Stockholm Conference in 1972, which placed the environment on the global agenda and created the United Nations Environment Program. Then, in 1981, Canada and 33 other countries endorsed the World Conservation Strategy, prepared by the International Union for the Conservation of Nature and Natural Resources (IUCN), with support from the World Wildlife Fund and the United Nations Environment Program. Third, in 1986 the United Nations sponsored the World Commission on Environment and Development (Brundtland Commission). Its 1987 report gave the world a new goal - environmentally sustainable development. I think that the Brundtland Commission made a number of important contributions to the greening process, not the least of which was its impact on thinking in corporate boardrooms, and the role it played in encouraging discussion rather than confrontation between industry, government, and environmental groups.

I have left our governments to the last on my list of catalysts of change. They have contributed to the greening process, but they have not played the strong leadership role that I think we normally expect from our legislators. There have been, and are, well-intentioned and knowledgeable ministers, government members, and public servants, but the political wheels have turned so slowly that governments have, by and large, abdicated leadership by the slowness of their action.

A few noteworthy achievements have contributed in a timely fashion to the greening process. A prime example is the environmental impact assessment process, which, when managed properly, provides opportunities for public involvement, "bottom-up" planning, and assessment of the environmental impacts of a project before construction starts. There are also two specific agencies of the federal government that have made significant contributions and that merit reference here, particularly because they helped to create environmental awareness through their interpretive programs: the Canadian Wildlife Service and Parks Canada.

I should make reference to environmental legislation. All governments in Canada have passed some form of environmental laws. I recognize the value and need for such legislation because the prospect of jail terms and personal liability is a powerful motivating force for corporate officials. I also believe that until governments pursue compliance and enforcement in a more meaningful way, public opinion and industry self-motivation will continue as the main determinants of corporate action on environmental concerns.

"Public opinion" is the key phrase in so many respects. It helps to motivate industry, and maintains pressure on governments to act. To be effective, it requires an informed and knowledgeable public with a strong environmental ethic. We have to depend largely on the various media to keep us informed about current environmental developments. For our basic knowledge and understanding, and, to a degree, for the development of our value systems, we rely on educators.

The Role of Educators

Earlier in this paper, I said that in my view there is a direct correlation between the teaching in our schools during the 1960s and 1970s, and the strong environmental ethic of today's young adults. If you doubt that statement, ponder the following questions:

Where did the young activist leaders of the environmental movement in the early 1970s come from? How were they created?

In the late 1970s, while employed in the petroleum industry, I noticed a more positive attitude toward the environment among the younger engineers. What caused this change from one generation to the next?

The president of one of Canada's major corporations recently told of the company's experience interviewing university graduates who were candidates for employment with his company. The interviews were not one-sided; the graduates asked about the company's environmental record! Did the educational system not play a major role in creating this level of environmental concern?

There appears to be no shortage of evidence that, in the 1990s, environmental education is finding a place in the teachings at most of our educational institutions. For example, an article in a recent issue of *Education Forum*, published by the Ontario Secondary School Teachers' Federation, dealt with the greening of the curriculum, and gave accounts of how "environmental issues can be integrated into the entire curriculum, making every discipline part of the movement for global survival." In Calgary, where I live, the Board of Education has established an Environmental and Outdoor Education Team to give leadership to environmental and outdoor education in elementary and secondary schools, with the stated goal of "creating a more environmentally literate society for the future."

Other examples of current efforts in environmental education could be found across the country, but I think it would be more instructive, in assessing the impact of educators on the greening process, to look at the past.

I suspect that educators in Canada have generally minimized in their own minds their achievements in environmental education because it was not a structured, legislated part of the educational system. In the United States, by comparison, the first federal Environmental Education Act was signed into law in 1970 (it was repealed in 1981, and the new Environmental Education Act did not

become law until 1990). The Journal of Environmental Education, published by a nonprofit foundation and directed at educators, began publication in 1969. In Canada, on the other hand, a 1972 survey by Environment Canada includes the following summary statement:

Activity which exists in Canada in the field of environmental education, exists at a local school board or district level, and in individual classrooms where ad hoc attempts are being made to provide students with exposure to environmental concerns.

There were similar findings in an overview prepared by John Passmore, also in 1972, for the Canadian Education Association. His report states:

One of the unusual features about outdoor education in Canada is that it has clearly been a "grass-roots" development; that it has come about with relatively little encouragement and support from above.

But there has been a great deal of interest and activity from below. With certain notable exceptions, individual schools and teachers — often with a great deal of community support — have almost always taken the initiative.

The above statements imply a certain degree of criticism of Canadian educational systems, but by the same token they compliment those educators, and those far-sighted school boards, who, with little direction or support, instilled in their students a sense of the environment as an ethical issue. Their students are now adults; they are our environmental leaders, our ethical investors, our green consumers, and the prospective company employees who question a large corporation about its environmental record. They are the proof that the best and longest lasting form of environmental advocacy is education.

Environmental education may have reached a new plateau in the 1970s, but I would be remiss if I did not acknowledge the longer term role served by educators. "Environmental education" is a term that became popular in the past two decades. Prior to that, "conservation education" and "outdoor education" were part of the course of studies of some schools in this country. If we look back even further, I think we would find that "nature study" or "natural science" was a standard part of our schooling.

Some of the earlier studies of the natural world may not have embraced the ecological concepts that are now the basis of our environmental understanding, but they were the precursors of environmental education. The extent to which they created concern and understanding of the natural world depended on the teacher. In retrospect, it is apparent that there were enough educators in those earlier decades who taught their students to appreciate and protect nature, that the "ripple effect" of their teachings set the stage for the explosion of environmental concern in the 1960s and 1970s.

I can best illustrate the ripple effect by referring to a few individuals as examples. They include Ian McTaggart-Cowan, the leading Canadian biologist, whose former students simultaneously occupied positions as heads of every wildlife department across Canada; and Stan Rowe, the grassland ecologist whose teachings and disciples permeate the provincial and national scene. For one last example, I want to step outside the field of professional educators: J. B. Harkin, our first Commissioner of National Parks (1911-1936) is credited for setting the standards that have placed Canada's national parks in the ranks of the finest in the world. John Passmore quoted the following statement by Mr. Harkin:

I look forward to a time when our national parks will be recognized schools for the study of nature, history and geology — places where children can get to know all sorts of living things at first hand.

There were others outside of the educational system, particularly in voluntary organizations — nature, wildlife, conservation, and environmental groups — who made important contributions to the natural science, conservation, and environmental education of young people over the years. But I believe that most of the credit belongs to the educators at the elementary, secondary, and university levels. Among them were and are many who have endeavoured to fulfil the objectives of environmental education as they were described in 1971 by William B. Stapp:

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the total environment and its associated problems, aware and skilled in how to become involved in helping to solve these problems, and motivated to work toward their solution

The Future

Buckminster Fuller once said that "the world is now too dangerous for anything less than Utopia." In terms of adequate care for the global ecosystem, we are a long way from Utopia. The advances that I have described in this paper add up to little more than a few steps along the road toward an environmentally caring society.

There has been progress in the greening of business and industry in this country, but there are still negative signals coming from parts of the corporate community. For example, an officer of the Independent Petroleum Association of Canada recently referred to "environmental extortion" as a cause of increased costs in the industry. In the U.S.A., the Center for Free Enterprise has advised the oil industry to organize its public relations to put environmental groups on the defensive, to mount litigation against environmental groups, and to establish a program to influence the media. In a recent series of articles on the business outlook to 1994, only one out of six top executives saw fit to comment on the environment as a factor. And obtuse statements about the increased cost of compliance with environmental statutes, and possible job losses, are heard with regularity.

Corporate Canada is greening, but it is not yet green. It has not fully accepted the advice of the World Commission on Environment and Development, that "the real world of interlocked economic and ecological systems will not change; the policies and institutions must."

The attitude of the general public is encouraging. One recent opinion poll showed that the recession made no difference to nearly 60 percent of people in their spending on "green products," while more than two-thirds said they would be willing to pay 10 percent more for a "green product" over one that was otherwise identical. And 76 percent said that the government should maintain environmental protection as a priority.

These figures are encouraging: at least we have an environmentally aware population. But do we have a population that understands the complex ecological systems on which human life depends, and of which human society is a part? Are people prepared to make the changes in their personal life styles that may be necessary to solve some environmental problems and ultimately to prevent an ecological apocalypse? This is the challenge, now and in the future — the near future, because it appears that we do not have decades to complete the shift to an ecologically sensitive social and economic life style.

I have observed, in recent contacts with the younger generation, a sad note of despair — even hopelessness — over the state of our environment. The young people are conversant with the megaproblems such as global warming, damage to the ozone layer, toxic waste, etc. Much of their awareness comes from the media, particularly from television, but awareness does not constitute understanding. The understanding that educators impart through environmental education is crucial in replacing that sense of despair with hope, optimism, and determined action.

I want to give the next-to-final word to Aldo Leopold, the great American conservationist, educator, and author of earlier decades:

The business of a university has heretofore been conceived to be the preparation of citizens to cope with their environment; the university must now take on the additional function of preserving an environment fit to support citizens.

Those prophetic words were written in 1934!

I think that Leopold would agree that, by 1991, the task has been spread beyond the university to all levels of our educational system.

Annex A

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March 31, 1991

LIST OF PUBLICATIONS

Reports

- (1) An Environmental Impact Assessment Process for Canada, February 1974 (out of print).
- (2) An Environmental Ethic Its Formulation and Implications, by N. H. Morse, January 1975 (out of print).
- (3) Harmony and Disorder in the Canadian Environment, by P. Danserau, 1975 (English out of print).
- (4) Towards an Environmental Ethic, by D. A. Chant, March 1977 (out of print).
- (5) Environmental Aspects of Nuclear Power Development in Canada, by H. E. Duckworth, H. W. Duckworth, A. Porter, and J. S. Rogers, 1977 (out of print).
- (6) Report of the Second Joint Meeting of Environmental Advisory Councils, May 1977, Fort San, Saskatchewan. (Produced in collaboration with the Saskatchewan Environmental Advisory Council, March 1978).
- (7) The Management of Estuarine Resources in Canada, by I. K. Fox and J. P. Nowlan, March 1978.
- (8) Report of the First and Second Meetings of Public Interest Groups with the Canadian Environmental Advisory Council, May 1978.
- (9) Ecotoxicity: Responsibilities and Opportunities, by R.H. Hall and D. A. Chant, August 1979.
- (10) Report of a Meeting Between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980. Published in 1981.
- (11) A New Approach to Pest Control in Canada, by R. H. Hall, July 1981.
- (12) Wildlife Conservation Issues in Northern Canada, by I. McTaggart-Cowan, October 1981.
- (13) Water Management Problems in the Third World: Lessons for Canada, by P. F. M McLoughlin, March 1983.

- (14) Terms of Reference, March 1984.
- (15) Report of the Eighth Assembly of Environment Councils of Canada, May 1984.
- (16) Selected Papers from Assemblies of the Environment Councils of Canada, 1975-1980, March 1985.
- (17) Sustainability of Farmed Lands: Current Trends and Thinking, by C. F. Bentley and L. A. Leskiw, March 1985.
- (18) Examining Environment-Economy Linkages, by R. A. Knowles, 1986.
- (19) Freer Trade and the Environment, May 1986.
- (20) Enforcement Practices of Environment Canada, by L. Giroux, June 1985. Published January 1987.
- (21) Review of the Proposed Environmental Protection Act, March 1987.
- (22) Canada and Sustainable Development, December 1987.
- (23) Preparing for the 1990s: Environmental Assessment, an Integral Part of Decision Making, February 1988.
- (24) Listing Toxics Under CEPA—Is the Chemistry Right?, May 1988.
- (25) PCBs: A Burning Issue. On the Siting of A Mobile PCB Incinerator, February 1989.
- (26) On the Role of Environmental Councils In Relation to the Canadian Environmental Advisory Council, by Dr. P. M. Bird, 1989.
- (27) Land Use Planning and Sustainable Development in Canada, by Nigel Richardson, 1989.
- (28) Indicators of Ecologically Sustainable Development: Economic, Ecological and Decision Theories, by Peter A. Victor, James J. Kay, and H. Jack Ruitenbeek, 1991.

Annual Reports

Annual Review 1973-1974. Part A — Activities. Part B — Problems and Priorities in the Canadian Environment.

Annual Review 1975. Part A — Activities. Part B — Significant Environmental Problems.

Annual Review 1976. Part A — Activities. Part B — The State of the Canadian Environment 1976.

Annual Review 1977-1978. Part A — Activities. Part B — The State of the Canadian Environment.

Review of Activities 1979-1980. (Includes: A Decade of Environmental Concern: Retrospect and Prospect; Environmental Assessment and Review Process: Observations and Recommendations.)

Review of Activities 1981-1982; 1982-1983. (Includes: A Perspective on the Canadian Environmental Advisory Council; Resolutions of the 1981 Assembly of Environment Councils of Canada.)

Review of Activities 1983-1984. (Includes: A Submission to the Royal Commission on the Economic Union and Development Prospects for Canada; Acceptable Risk; Assessing Proposals for a Canadian Pesticides Advisory Board; Completion of the National Park System in the North; The Key to the Future.)

Review of Activities 1984-1985. (Includes: Guidelines on Conflict of Interest Situations; The Central Council for Environmental Protection in the Netherlands; Canadian Agricultural Land Base: Quantity and Quality.)

Review of Activities 1985-86; 1986-87. (Includes: Ethics and Environment; A View Towards 2005 — Future Environmental Trends and Issues.)

Review of Activities 1987-88; 1988-89. (Includes: Sustainable Redevelopment: Focus for the University; Towards Sustainable Economic Development.)

Review of Activities 1989-1990. (Includes: What on Earth is Environment; The Role of Environmental Advisory Councils vis-a-vis Round Tables on Environment and Economy.)

ROUND TABLES IN CANADA: EVOLUTION AND PURPOSE

by Robert Page*

Premier Filmon, Round Table members, and staff, I am honoured to be here at the first joint meeting of the Round Tables on Environment and Economy and to have this opportunity to say a few words. It is delightful to see familiar faces and many new ones. You represent a powerful force for progress and change. Collectively, you have the ability to bring Canada into a new era of mutual respect and harmony between the essential needs of our economic system and the constraints of ecology. The task before you is a daunting one, given the complexity of our country and the diversity of interests involved.

The Council that I chair has been a very interested spectator to this whole process. There are a number of people who deserve great credit for the progress in each jurisdiction, and many are here this morning. If I may take the example of our host, the Province of Manitoba, one can see a clear pattern. The Premier and his government have demonstrated their commitment to the National Task Force report right from the beginning. The Premier established and chairs the Manitoba Round Table, and brings its deliberations directly to the highest levels of government. Manitoba has also played a critical role, along with the federal government, in creating the International Institute for Sustainable Development in Winnipeg. Manitoba has not only been a pioneer in the round table process, it has also restructured its cabinet committees and governmental decision-making processes to ensure that environment-economy concerns have a direct influence on policies and decisions. In my view, it is most appropriate that this meeting should be here in Winnipeg with the Premier in attendance.

It is a remarkable achievement for Canada that every government has now formed or is in the process of forming a round table to take up the challenge of sustainable development. This has occurred in spite of the controversies now plaguing our country and hindering cooperation in other sectors.

While they are a remarkable achievement, round tables are also essential tools, since the challenge of sustainable development requires us to mobilize as never before the political will of the country to deal with the urgency of a series of environmental challenges eroding the life processes and the economic potential of the planet. We must all recognize that this situation is unprecedented in our history, and that future generations will judge us by our actions, not our words.

I have been asked to start off this morning with some comments on the historic evolution and mandate of round tables as a contribution to your deliberations in charting present trends and future prospects. I think it is useful to go back to consider some of the goals and aspirations of the founders as a benchmark to measure progress thus far.

In a direct sense the Round Tables are a product of the recommendations made by the National Task Force on Environment and Economy, which reported to the Canadian Council of Resource and Environment Ministers (CCREM) in September 1987, and which was itself linked to the Brundtland Commission and its famous report. While this statement is factually correct, it is superficial. The Round Tables grew out of the political traditions of Canada and the specific events of the last two decades.

^{*} This was the keynote address to the first joint meeting of the Round Tables on Environment and Economy in Winnipeg on 27 April 1990. Dr. Page is the Chairman, Canadian Environmental Advisory Council.

The Round Table concept builds on the Canadian instinct for consultation and consensus, rather than adversarial processes (as are evident in the United States). Canadian commitment to these principles goes back to the British North America Act of 1867 (consultative role for a nonelected Senate) and the frequent use of royal commissions as means of tapping multistakeholder opinions. These traditions were put into an environmental context in the 1970s by the new standards for public participation created by the Berger inquiry, and by the establishment and evolution of the environmental impact assessment processes in both federal and provincial jurisdictions. However, the effectiveness of these processes has been limited by the polarization of the debate between the environmentalists and those promoting industrial expansion. This polarization was intensified by the doomsday scenario of "the limits to growth" debate, that made it appear that a quality environment and economic growth were irreconcilable opposites. It was this ominous impasse that worried those who were seeking solutions rather than confrontation.

As a result of the above, there have been a variety of efforts in Canada to find ways of overcoming this dialogue of the deaf. In both the nongovernmental organizations (NGOs) and the corporate sector there has been a growing maturity in handling environmental issues, and in the search for new means to resolve matters in dispute. In 1978, the Canadian Environmental Network was created to foster a common front of the NGOs in dealing with the government. In 1980, the international effort to create a world conservation strategy helped to trigger new thinking. During the 1980s, there was an important experiment in multistakeholder consultative consensus seeking called the "Niagara process," involving governments, industry, and NGOs. Its application to the development of the "cradle-to-grave" management of toxic chemicals was a major achievement and a confidence builder.

During the same period in the mid-1980s, the World Commission on Environment and Development, headed by Madam Brundtland, was touring every continent seeking public input. In 1986, the Commission held public meetings in six Canadian cities and evoked a wide public response. In Edmonton, the members of CCREM met with the members of the Brundtland Commission, out of which came their decision to establish a national task force to initiate a dialogue among senior decision makers on environment-economy integration in Canada. In April 1987,

the Brundtland report was released with its now famous definition of sustainable development, which:

... meets the needs of the present without compromising the ability of future generations to meet their own needs.

Much of the evidence and arguments was not new, but the report presented its findings with a new cohesion, eloquence, and clarity. Above all, with the slogan "sustainable development," it appeared to have found the formula to resolve the impasse between environmentalists and those promoting economic growth. However, it left the defining and the implementing of sustainable development to those who would follow. As in all good political documents, unanimity was secured through ambiguity.

In the fall of 1987, the National Task Force submitted its report to CCREM with a variety of recommendations, including the establishment of round tables at the national, provincial, and territorial levels. The report was short, clear, and with precise recommendations for building environment-economy linkages and for reforming government and industry decision-making processes. It ended with the call for the preparation of action plans to implement its recommendations from all provinces, territories, and the federal government.

Several action plans have been prepared, but the public is still awaiting a full response from every government. I trust that all Round Table members are familiar with the National Task Force's arguments and recommendations, and are keeping up the pressure to ensure that action plans are prepared.

The report and the response to it by all jurisdictions across the country have been recognized internationally as a very important initiative in implementing sustainable development. You should all recognize that your efforts are part of a uniquely Canadian effort at world leadership that Canada will report on at the world conference in 1992 in Brazil. For that reason, the Round Tables are of importance far beyond the jurisdictions in which they operate, and collectively will continue to be viewed by others with great interest.

But before we begin to congratulate ourselves in advance of 1992 we must look very candidly at our ability thus far to meet the challenges of sustainable development and the hopes of many of the founders. For the rest of this talk I want to lay out those challenges. I leave it up to you to determine how well your Round Tables are meeting them.

Composition and Leadership

Each of the Round Tables must able to attract and to retain the committed services of leading decision makers. There must be vigorous dialogue from leading figures in government, business, and the NGOs for the product to carry weight within all three sectors as well as with the wider public. Each Round Table has developed a slightly different approach to procedures, to membership, and especially to chairing: in Manitoba, the Premier; Northwest Territories, the Government House Leader, Ontario, the Chairman of Management Board of Cabinet; Quebec, the Minister of the Environment; British Columbia, a private consultant; and the National Round Table, a university president. In some ways my favourite is Prince Edward Island, where Gilbert Clements is both Minister of Finance and Minister of the Environment, which captures the spirit of sustainable development perfectly.

The Reporting Relationship

Whoever is chair must guard fiercely the lines of communication and the reporting relationship to the first minister and thus to the cabinet. If the reporting relationship is sidetracked from direct access and hence into the bureaucracy, the Round Tables will suffer the same fate as many other advisory bodies whose reports disappear from view. Many believe that the reporting relationship is the key to the effectiveness of the whole round table system as well as the best guarantee that good people will be retained. The original National Task Force members felt strongly that this relationship is fundamental to success. I believe they were right.

Defining the Goal

One of the great problems of all round tables is to give shape and substance to the nebulous concept of sustainable development. In Canada we must bring some order to this intellectual debate, which has been dominated thus far by what sustainable development is *not* rather than what it is. For some of us who have been groping ineffectively in the dark, we look to the Round Tables and the Winnipeg institute for leadership.

The focus for the work of the Round Tables should be on strategic and long-term policy analysis, as opposed to problem solving, which many existing institutions are designed to deal with. They need to concentrate on some of the tough issues, such as the tradeoffs inherent in environment-economy integration, the reform of decision-making processes and structures, the greening of management and institutional philosophies, and the development of conservation or sustainable development strategies. They should deal with specific issues or local events only insofar as they relate to the wider strategic goals. Otherwise, there are many traps and pitfalls for the Round Tables. They have neither the expertise nor the staff to deal with specific issues and problems and could easily get diverted from their own agendas in the process.

Round Tables and the Wider Public

Potentially the greatest ally of the Round Tables is the public, who are upset with the status quo but uncertain where to turn for advice. To be effective, the Round Tables must have a high public profile as agents for change, yet remain clear of partisan political battles. This is all the more difficult with ministers on nearly every Round Table. Therefore each Round Table must develop a communications strategy so that it can contribute to the public debate while limiting tensions with the government it advises. This requires careful diplomacy and statesmanship to avoid isolation from government, industry, NGOs, or the public.

Round Tables and the Bureaucratic Process

While statesmanship is required, there also must be clear pressure for change. Any fundamental change in the process of government will encounter inertia and resistance from those within the system who view it as a challenge to their power or jurisdiction. Public sector structures are far more resistant to change than the private sector because of the checks and balances that have been developed, often for good reasons, within their decision-making systems. As outsiders, the Round Tables will only be successful if they can mobilize *political will* to impose appropriate changes on these systems. Few outside government can properly appreciate the full extent of the problem in ensuring that environmental priorities become understood and acted upon by all areas of government.

The Secretariat

Given the level of executive and ministerial expertise on the Round Tables, it is easy to underestimate the need for adequate secretariats headed by able executive directors. The effectiveness and the independence of the Round Tables depends upon the quality of the staff work, including access to outside contract research. If the solutions were easy or obvious, there would be no need for round tables. Also, out of meetings like these, I would hope that advice could be pooled between the Round Tables, and a support role for the new Winnipeg institute be devised.

Jurisdictional Boundaries

In the work of the Round Tables, two levels of environmental considerations are not properly addressed with current structures: municipal and international. The Round Tables are designed to deal with provincial, territorial, and federal levels of government, yet two of the four levels of government fall outside their purview. Many of the most pressing environmental issues involving air and water quality, waste disposal sites, planning, and so on are at the municipal level. Recognizing this, several Round Tables have municipal representation. Mayor Sylvia Sutherland of Peterborough, a member of the Ontario Round Table, has established her own round-table-style sustainable development committee to advise local government in the area. Likewise, at the other end of the policy spectrum, especially for climate change, there must be an international perspective. The National Round Table has begun consideration of the international dimensions of sustainable development, and I would strongly encourage the vigorous pursuit of this initiative.

Balance Between Economic and Ecological Principles

While it is essential that there be real strength on the economic side in round table membership, it is equally

important that there be strong representation from those with experience and understanding of ecological principles. Our response to climate change, for instance, involves a science-driven revolution, where the strengths and limitations of our modelling must be understood to appreciate the economic implications. Nor can we lose sight of the areas of economic interdependency that flow out of the biological interdependency of species. Ecosystems are the basis for renewable resource industries, such as fisheries, forestry, and agriculture. But ecosystems are like bicycle wheels, with many species as the spokes. Each broken spoke lessens the ability of the wheel to run true. When enough spokes are broken, the wheel collapses, upsetting the rider.

Conclusion

In my talk this morning I have tried to articulate some of the hopes and fears of those who worked to establish this process. Although they are unified in objectives, each Round Table reflects its own circumstances in a properly Canadian fashion. In closing I want to come back to two basic points:

First, the CCREM Task Force Report remains an impressive document for helping to shape advice on an action plan in every jurisdiction.

Secondly, in the light of the scientific evidence emerging daily, there is a sense of urgency for your task that is devastatingly clear.

Premier Filmon, I want to thank you for the honour of speaking this morning, and I wish Godspeed to you and your colleagues on the Round Tables in your deliberations. Like many Canadians, I will be watching closely your future progress.

INDICATORS OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT: ECONOMIC, ECOLOGICAL, AND DECISION THEORIES

EXTRACTS*

Indicators of Sustainable Development: Some Lessons from Capital Theory

by Peter A. Victor

This paper has been written in response to a request for a brief overview of alternative theories of economics and their approaches to sustainable development. Of particular interest is the possible relevance of each of these theories of economics to indicators of sustainable development. In response to such a daunting request, it was proposed that the paper be structured around the theory of capital and its relationship to sustainable development. At the time, this seemed in keeping with much of the contemporary literature on sustainable development, which stresses that the depletion of environmental resources in the pursuit of economic growth is akin to living off capital rather than income. The meaning and role of capital has been one of the main defining characteristics of different schools of thought in economics. Presumably, if there is much to be learned from economics about sustainable development, then discussion of capital would be key to developing our understanding.

As it turned out, this presumption was only partially correct. A review of capital theory is a useful way into an enormously complicated set of issues. Much can be learned from capital theory, in its various guises, that is relevant to sustainable development. Yet capital is not an

entirely satisfactory way of conceptualizing the environment, and as much can be learned about sustainable development from the limitations of capital theory as from its strengths.

A major part of the concern about the sustainability of development relates to the environment's limited capacity to provide resources, accept wastes, and accommodate other forms of alteration, all of which are inevitable with economic activity. This is a recurring theme throughout this paper. Other aspects of sustainable development, such as a requirement for durable social and political structures and for reinforcing ideologies, are not considered.

The paper starts with an exploration of the environment as capital within the neoclassical framework. In neoclassical economics, the role of substitution and technological progress in scarcity and the effectiveness of markets in allocating resources to alternative uses at different times are central to the discussion.

The neoclassical school tends to treat all forms of capital as highly substitutable. Some economists, including Pearce and his colleagues in London, stress the differences

This annex contains edited extracts from the three background papers that were prepared for the CEAC workshop on indicators of ecologically sustainable development, and subsequently published in the report *Indicators of Ecologically Sustainable Development: Economic, Ecological, and Decision Theories.*

between manufactured capital and what is frequently referred to as "natural capital." Pearce has proposed that maintenance of the stock of natural capital is a requirement for sustainable development. This proposal is explored under the heading of the London school. This paper suggests that such an approach leaves unresolved fundamental problems of the measurement of capital stock.

Attention then turns to the critique of the neoclassical approach to capital by the post-Keynesian school, and to the relevance of this critique to the extension of capital theory to the environment. The issue of measuring what has come to be termed "natural" or "environmental" capital in some quarters is brought into focus in this discussion, since it is the measurement of capital that underlies much of the neoclassical critique of the post-Keynesian school.

At this point, the discussion takes up the issue of whether the environment is well conceptualized as capital. Perhaps capital as the "produced means of production" of an economy does not provide an entirely sound conceptual basis for considering the environment, which is a gift of nature. According to the classical economists of the eighteenth and nineteenth centuries, land and capital play very distinctive roles in the economic process. Marshall, one of the founders of neoclassical economics, recognized this distinction but observed that economists of his day were emphasizing the similarities between land and capital rather than their differences. A review of his thoughts on this matter provides a useful commentary on the concept of natural capital.

Following Marshall's lead, it becomes apparent that any theory of the economics of sustainable development needs to be more explicit about the fundamental constraints on economic activity. Some economists, such as Ayres, Kneese, and Victor, have explored the relevance of the materials/energy balance principle for economics. This principle is based on the law of conservation of matter and energy, which is the first law of thermodynamics. Prom-

ising empirical work has been based on this approach. Others, most notably Georgescu-Roegen and Perrings, have emphasized the entropic nature of the economy, based on the second law of thermodynamics. Not only must all of the material and energy used in economic activity be disposed of back into the environment, but they are degraded and their capacity to support future economic activity is reduced.

For at least a quarter of a century, Daly has helped develop and promote both of these sets of ideas, which are collectively referred to in this paper as the thermodynamic school. Daly has brought to the discussion an emphasis on the inevitability and desirability of a steady-state economy. Recently, he has devoted his attention to developing operational principles for sustainable development. A consideration of his ideas, especially as they relate to indicators of sustainable development and capital theory, brings this paper to a close.

Although an attempt has been made to identify the leading economists in each school, in most cases the works that are reviewed are only a small portion of a very substantial body of literature. The paper does not pretend to be comprehensive. Further, some economists have contributed to more than one school, so the assignment of an economist to any one school should not necessarily be interpreted as a rejection by that economist of the ideas associated with another school.

It should also be recognized at the outset that the range of issues considered within the context of each school is limited to a few questions that are designed to bring into focus the main ideas relating both to capital and to indicators of sustainable development.

Even though some of the more technical material is confined to an appendix, much of the discussion is theoretical and demands much from the reader. However, it is hoped that at least some of the ideas presented will help establish a firmer basis for sustainable development indicators.

The Concept of Ecological Integrity, Alternative Theories of Ecology, and Implications for Decision-Support Indicators

by James J. Kay

To begin, let us consider how nonequilibrium thermodynamics suggests that systems develop. Prigogine has shown that under certain conditions, open systems with a gradient across their boundaries will move away from equilibrium and will establish new stable structures (Prigogine and others, 1972; Nicolis and Prigogine, 1977, 1989). This is the opposite of the behaviour one would normally expect, given the second law of thermodynamics. Such systems are characterized by rates of energy dissipation, which increase as the system moves from equilibrium and becomes more organized. Hence the name "dissipative structures." Simple examples are vortices in bathtubs, tornados, and lasers.

The development of such self-organizing systems is characterized by phases of rapid organization to a steady-state level followed by a period during which the system maintains itself at the new steady state. The organization of the system is not a smooth process, but rather proceeds in spurts. These spurts are a sudden acceleration in the change in the state of the system. The state change may be continuous or catastrophic. The change in the state is accomplished by the addition of new dissipative structures to the system. These new structures can consist of new pathways for energy flow that connect old components, or new components and their associated new pathways. Each spurt results in the system moving further from equilibrium, dissipating more energy, and becoming more organized. Each spurt occurs when random environmental conditions exceed a catastrophe threshold for the system. The path through state space that the system follows as it develops in a stable environment is called the "thermodynamic branch." Ecosystem succession is an example of this kind of process. Each of the serial stages corresponds to one steady-state plateau. The displacement of a previous serial stage by the next is an example of a spurt, the reorganization of the system to a new level of structure that dissipates more energy.

The gradient that drives ecosystem development is the solar energy impinging on the ecosystem (Kay, 1984, 1989). As ecosystems are driven away from equilibrium, they become more organized and effective at dissipating solar energy. At the same time as this self-organizing process is occurring in ecosystems, external environmental fluctuations are tending to disorganize the system. The multidimensional state space for which the disorganizing forces of external environmental change and the organizing thermodynamic forces are balanced is referred to here as the "optimum operating point."

For any real ecosystem, a particular point will be an optimum operating point only temporarily. This is because the external environment will be in flux and evolution will be proceeding, thus changing the balance between the organizing and disorganizing forces. However, it is useful over short time periods to treat the optimum operating point as if it were stationary. The climax community in ecological succession would be an example of an optimum operating point for an ecosystem. The climax community represents a temporary balance between the organizing forces in ecosystems and the disorganizing forces. Over evolutionary time, however, new species will enter the equation. So will new environmental phenomena. This will result in a new climax community, and a different optimum operating point.

In the context of these ideas, our sense of the system as a whole, that is, of its integrity, has to do with the ability of the system to maintain its organization and to continue its process of self-organization. If a system is able to maintain its organization in the face of changing environmental conditions, then it is said to have integrity. If a system is unable to maintain its organization, then it has lost its integrity. Integrity is the ability of the system to attain and maintain its optimum operating point.

The reader must be aware of this important implicit aspect of the definition of integrity. Ecosystems are not static. Their organization is often changing, both in the short term and in an evolutionary sense. Furthermore, any loss of organization is often gradual. Thus it is not possible to identify a single organizational state of the system that corresponds to integrity. Instead there is a range of organizational states for which the ecosystem is considered to have integrity. For the sake of discussion, the optimum operating point is treated as a single stationary point in multidimensional state space. In reality, it is a set of points in state space whose membership changes over time. The definition of this set would necessarily have a human component.

Also, the reader should be aware that the theory of dissipative structures suggests that a number of different organizational and developmental pathways are available to ecosystems. These pathways are nonlinear and may be discontinuous and multivalued. Thus the (set of) optimum operating point(s) or set point for the system is not unique. There will be several different possible (sets of) optimum operating point states for the system. As Holling (1986) has shown, the normal course of ecosystem development can consist of flips in state, that is, catastrophic changes.

The balance of this paper is a discussion of the use of these notions to examine ecosystem response to environmental change, and of the implications for integrity as a concept central to sustainable development indicators.

The Role of Indicators in the Decision Process

by H. Jack Ruitenbeek

As we are making decisions every day, we often take the decision process somewhat for granted and, in the extreme, disavow that it is even a factor in shaping results. This paper, therefore, attempts to provide a discussion framework that allows us to step back and look more critically at the decision process as another step between gathering information and turning that information into actions that will promote ecologically sustainable development (ESD). Although many of the issues raised in this paper will be familiar, it is hoped that they will provoke enough interest to stimulate further focused discussion of these issues in the context of designing ESD indicators.

The idea that ESD is a desirable economic policy goal is being more widely professed within both the ecological and economic disciplines. Macroeconomic policy makers are facing the often difficult challenge of designing policies, programs, or projects to promote this goal. At the same time policy analysts are faced with the challenge of selecting and analyzing the most effective means for measuring policy effectiveness. Keen interest has thus arisen in developing indicators that somehow reflect the principle of ESD.

The role of indicators in ESD is driven by both the theoretical paradigms (ecological or economic) that underlie them, and their eventual role in the decision process. The two companion papers by Kay and Victor in the present volume address some of the linkages between the various ecological and economic theories or approaches, and the indicators that can be derived from these approaches. A key conclusion of these papers is that the appropriate set of ESD indicators will depend on the theoretical paradigms from which the indicators are derived; there is no general theoretical consensus on what an appropriate indicator of ESD is.

Even if such indicators are generated, however, it is clear that they must eventually be translated into a final decision and accompanying action. The steps and the analytical techniques that are applied at this stage can be independent of those used in generating the indicators in the first place. It could be just as important to describe how a given indicator is used within the decision process as it is to describe its initial derivation or theoretical foundation. But the connections between ESD indicators and the decision process are often not explicitly considered in discussions of sustainable development.

The general objective of this paper is to concentrate on issues that are not specific to a particular ecological or economic theory but that are nonetheless relevant in drawing connections between ESD indicators and the decision process.

Any potential indicator of ESD — whether a measure of environmental integrity, human welfare, or economic wealth — will eventually be treated as a specific unit of information ("I"), which is ultimately translated into some action ("A"). The actual decision process ("D") can be thought of as an analytical framework, which itself serves to operationalize the myriad and sometimes contradictory indicators. The scope of this paper involves addressing issues related to the decision process that are believed, prima facie, to be relevant to the issue of sustainable development. In particular, the paper will consider the following:

- a) The decision process. There is no collective decision process that will generally achieve an optimal allocation of resources. We discuss the importance of describing the collective and individual decision processes that do exist, as different descriptions of the decision process could require different types of indicators.
- b) Roles of indicators as objectives, inputs, or constraints. Any given indicator can, in the decision process, generally take on one of three roles. We discuss the importance of identifying what role a given indicator is meant to play within a given

decision and will show, through a simple example, how different treatment of indicators might translate into different policy decisions.

c) Role of indicators in addressing expectations, risk, and uncertainty. Risk and uncertainty are often important attributes of a decision process and various analytical techniques are available to address these factors. We shall briefly delineate the various techniques and outline the special requirements of such techniques when identifying and using ESD indicators.

The reader is forewarned that the approach taken in this paper relies very much on aspects of decision theory addressed in the economics literature. A vast body of literature also exists in other disciplines — philosophy, political science, psychology, sociology, and business administration, to name but a few. We concentrate on economics literature because many decision makers rely at least partially on economic rationales for their actions.

Although the discussion draws on many aspects of economics literature, it relies more precisely on work covered in welfare economics and political economics. In decision theory, welfare economics has traditionally concentrated on how individual "agents" make choices. It investigates how any single agent — a consumer, a firm, or even government as a whole — makes decisions when presented with various choices. Concepts of economic allocative efficiency and distributive equity play an important role in the principles of welfare economics. Political economics, again as applied to decision theory, have complemented this by concentrating on the existence and nature of collective choice mechanisms, how these mechanisms are reconciled to individual needs, and how they incorporate other political issues such as ethics and civil liberties. The literature thus lets us consider decisions in a generalized framework that can address matters of efficiency, equity, ethics, and uncertainty, all of which play important roles in discussions of ESD.

This literature is also of interest because, to a large extent, it has formed part of an active debate over whether economic structures should be market oriented or coercive through government regulatory intervention. Interestingly, arguments promoting sustainable development often differ on which is more desirable: market solutions or government coercion. Although it is beyond the scope of this paper to address these arguments, the issues raised here will allow us to revisit some of the theoretical underpinnings of this debate and, in the process, shed some light on the role of both the collective and individual decision process in achieving sustainable development.

In addition, it is recognized that the nature of the decision maker — consumer, administrator, policy maker, manager, scientist — can itself impose quite different information demands on indicators. The idea that indicators must be designed for the appropriate target audience is generally acknowledged as a vital consideration in formulating and reporting indicators. Rather than distinguishing between different target audiences, however, this paper will focus on concepts that are not necessarily audience-specific. Where a specific audience for indicators is implied, we shall generally focus on policy makers or individual members of the public who influence policy makers.

Some of the basic concepts discussed here will be familiar to those working in applied or theoretical economics. Economics literature on decision theory does not, however, explicitly address issues relating to ESD indicators. This paper thus complements this literature by presenting the issues in a manner that will be helpful to policy makers trying to come to grips with how these indicators might eventually be incorporated within their decisions.

This paper does not advocate the use of any particular decision technique or process; however, it does present suggestions for where Canada might direct some of its efforts in designing types of indicators.

THE GREEN PLAN: VISION AND LEADERSHIP IN THE 1990S AND BEYOND

Part 1. Vision

- Canada as a place where people understand and respect nature, and seek to sustain it and live in harmony with it.
- Canada as a place where all people are treated equally and fairly, and where the same value is extended to other nations and future generations.
- Canada as a place where different approaches to sustainability and the contributions of different cultures are recognized and encouraged.
- Canada as a place where individuals have the right and the opportunity to participate in decisions that affect them.

The Council believes that the Green Plan must first and foremost be based upon a national vision of sustainable development shared by all Canadians. This vision should be simple and direct, and it should encompass a value system that will continue to guide our actions long after the first steps toward sustainability are taken.

An important consideration is that many of our environmental problems have arisen from the absence of a "land ethic." We must re-evaluate the underlying basis of the human/environment relationship in modern Canadian society, reinforcing our cultural and philosophical ties with the environment, emphasizing:

- a) Sustainability over profitability
- b) Quality of life over gross national product
- c) Jobs aligned with environmental integrity over jobs at all costs

- d) Long-term rather than short-term orientations to problems
- e) Biocentric philosophy to complement homocentric perspectives
- f) Attention to the sources of environmental problems, rather than the effects

At a time when the people of Canada are defining and refining their identities, the Council believes that these identities are all closely linked with maintaining the integrity of our natural environment.

Sustainable development will not be achieved by short-term actions and marginal adjustments in attitudes and behaviours. Yet the process of accommodating different interests and views, and convincing those who hold positions of power, means that progress may be slow and erratic. A vision is needed to direct and give momentum to this process of change. In the long run, movement toward the vision will be the most efficient and harmonious pathway to sustainability.

The time horizon for our national vision should extend beyond the tenure of the current generation of decision makers so that our children can see today the task that is being passed on to them, for it is our children and their children who will pursue and complete this task. We must share this vision with our children so that they understand it and are prepared for the role they will play. To gain their acceptance, the vision must be clear to them.

The Council is of the view that the basic elements of the value system that will lead to sustainable development are becoming understood and accepted by Canadians. We

^{*} This document is an extract from a working paper titled *The Green Plan: Vision and Leadership in the 1990s and Beyond*, prepared by the Council as a basis for discussions on the Green Plan.

have identified four key values that are central to the vision of sustainable development. These are:

- · Respect for nature
- · Equity and fairness
- · Diversity (cultural, biological)
- · Individual and community empowerment

First, the national vision must be built on a knowledge and appreciation of nature that enables people to see themselves as an integral part of the environment, not separate and omnipotent. This viewpoint is central to the survival of the human race and of other species. It requires the acceptance of ecological constraints on human activities. It is the starting point for sustainable development and it gives direction and meaning to science and education.

Second, the vision must fully encompass the need to view all people as having an equal right to exist and prosper. This accords with the prominence given by the Brundtland Commission to lesser developed countries and to poverty, which deprives people of the opportunity for a healthy and meaningful life. Poverty itself is recognized as a major cause of environmental deterioration that must be addressed before we can achieve sustainable development. This part of the vision calls for the development of new institutional structures and a new world orientation that guards the rights of present and future generations. It will require unprecedented levels of international cooperation, especially as the world population continues to expand, and places an onus on Canada to keep the environment and equity concerns prominent in international forums. It

must also underlie the application of the Green Plan within Canada.

Third, we increasingly value the different cultures that make Canada a respected member of the global community. If Canada is rich in natural resources, it is equally rich in cultural diversity. The vision of sustainable development must support and draw upon the strength that cultural diversity offers. This means that different solutions and different pathways to sustainable development exist and will often be culturally determined. The same reasoning applies even more so to global sustainability.

Finally, the vision must include the value of individual and community empowerment. The Canadian public has developed a high level of maturity in its understanding of institutions, governments, and decision-making processes. The continuing evolution of individual rights and freedoms, and the desire to participate in decisions that affect them, are empowering people to intervene effectively in decision-making processes. Empowerment adds an important element of "bottom up" to complement and guide "top down" decision making, and helps people to think globally and act locally, as called for by the Brundtland Commission. Individual and community empowerment should be nurtured to ensure that governments and industry do their share of the common effort, and to re-establish public confidence in our ability to move toward sustainable development. In turn, individuals and communities must recognize that they have environmental responsibilities that must be balanced against these rights.



